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On the cover: *Megachactops kuemoi*, n. sp., adult female, from Autana, Amazonas, Venezuela. Photo. José A. Ochoa.

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Systematic Revision of the Neotropical Scorpion Genus *Chactopsis* Kraepelin, 1912 (Chactoidea: Chactidae), with Descriptions of Two New Genera and Four New Species

José A. Ochoa, Fernando J. M. Rojas-Runjaic, Ricardo Pinto-da-Rocha, and Lorenzo Prendini

Bulletin of the American Museum of Natural History

SYSTEMATIC REVISION OF THE NEOTROPICAL SCORPION GENUS *CHACTOPSIS* KRAEPELIN, 1912 (CHACTOIDEA: CHACTIDAE), WITH DESCRIPTIONS OF TWO NEW GENERA AND FOUR NEW SPECIES

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ABSTRACT

The Neotropical chactid scorpion genus *Chactopsis* Kraepelin, 1912, is revised. New diagnoses are presented for all previously described species, most of which have not been revised since their original description. The trichobothrial pattern is reinterpreted and the hemispermatophore described for the first time. *Chactopsis* is restricted to eight species, two of which are new: *Chactopsis chullachaqui*, n. sp., from Peru and *Chactopsis curupira*, n. sp., from Brazil. *Chactopsis insignis* Kraepelin, 1912, is redescribed and supplementary data on pedipalp trichobothria and hemispermatophore (where known) provided for *Chactopsis amazonica* Lourenço and Francke, 1986, *Chactopsis barajuri* González-Sponga, 1982, *Chactopsis buhrnheimi* Lourenço, 2003, *Chactopsis siapaensis* González-Sponga, 1991, and *Chactopsis sujirima* González-Sponga, 1982. Two new genera are created to accommodate the remaining species, formerly assigned to *Chactopsis*, based on a cladistic analysis of morphological characters. *Chactopsoides*, n. gen., accommodates *Chactopsoides anduzei* (González-Sponga, 1982), n. comb. (type species), and *Chactopsoides marahuacaensis* (González-Sponga, 2004), n. comb., *Chactopsoides gonzalezspongai*, n. sp., from Venezuela, and *Chactopsoides yanomami* (Lourenço et al., 2011), n. comb., from Brazil. *Chactopsoides anduzei*, n. comb., is redescribed and *Chactopsis carolinae* Botero-Trujillo, 2008, synonymized with it. Supplementary data on pedipalp trichobothria are provided for *C. marahuacaensis*, n. comb. *Megachactops*, n. gen., accommodates *Megachactops coriaceo* (González-Sponga, 1991), n. comb., and *Megachactops kuemoi*, n. sp. (type species), from Venezuela. Supplementary data on pedipalp trichobothria and hemispermatophore are provided for *M. coriaceo*, n. comb. A key to identification of the species of *Chactopsis*, *Chactopsoides*, n. gen., and *Megachactops*, n. gen., is provided, their morphology illustrated, and distribution records mapped.

INTRODUCTION

The genus *Chactopsis* Kraepelin, 1912, was created to accommodate *Chactopsis insignis* Kraepelin, 1912, from the Peruvian Amazon. The female holotype of *C. insignis* remained the only known specimen of this genus until the 1950s. Although erroneously assigned to *C. insignis*, Scorza's (1954a, 1954b, 1954c) Venezuelan records were the first indication that the distribution of *Chactopsis* extended to the forests of the Orinoco River basin. Six species were subsequently described from Venezuela (González-Sponga, 1982, 1991, 2004): *Chactopsis anduzei* González-Sponga, 1982, *Chactopsis barajuri* González-Sponga, 1982, *Chactopsis coriaceo* González-Sponga, 1991, *Chactopsis marahuacaensis* González-Sponga, 2004, *Chactopsis siapaensis* González-Sponga, 1991, and *Chactopsis sujirima* González-Sponga, 1982; three from Brazil (Lourenço and Francke, 1986; Lourenço, 2003; Lourenço et al., 2011): *Chactopsis amazonica* Lourenço and Francke, 1986, *Chactopsis buhrnheimi* Lourenço, 2003, and *Chactopsis yanomami* Lourenço et al., 2011; and one from Colombia (Botero-Trujillo, 2008): *Chactopsis carolinae* Botero-Trujillo, 2008. *Chactopsis* currently includes 11 species occurring in the rainforests of the two major Neotropical river basins, the Amazon and Orinoco rivers, in Brazil, Colombia, Peru, and Venezuela (figs. 1–5). Specimens of *Chactopsis* are scarce in museum collections (Soleglad and Sissom, 2001), however: half of the species are known from fewer than four specimens, and four species are known only from the holotype.

Two morphological characters were traditionally used to diagnose *Chactopsis* from other scorpion genera: the peculiar Type C trichobothrial pattern of the pedipalp chela and patella (Kraepelin, 1912; Vachon, 1974; González-Sponga, 1978, 1996; Stockwell, 1989; Sissom, 1990; Soleglad and Sissom, 2001); and the pedipalp chela finger dentition, which comprises a single median denticle row flanked by numerous external and internal accessory denticles arranged in two to five rows, i.e., multiple primary rows of denticles (Kraepelin, 1912; Soleglad, 1976; González-Sponga, 1978; Stockwell, 1989; Lourenço, 1998; Soleglad and Sissom, 2001). Although these characters may be autapomorphic for *Chactopsis*, its phylogenetic position with respect to other chactoid scorpions is controversial and remains to be rigorously tested.

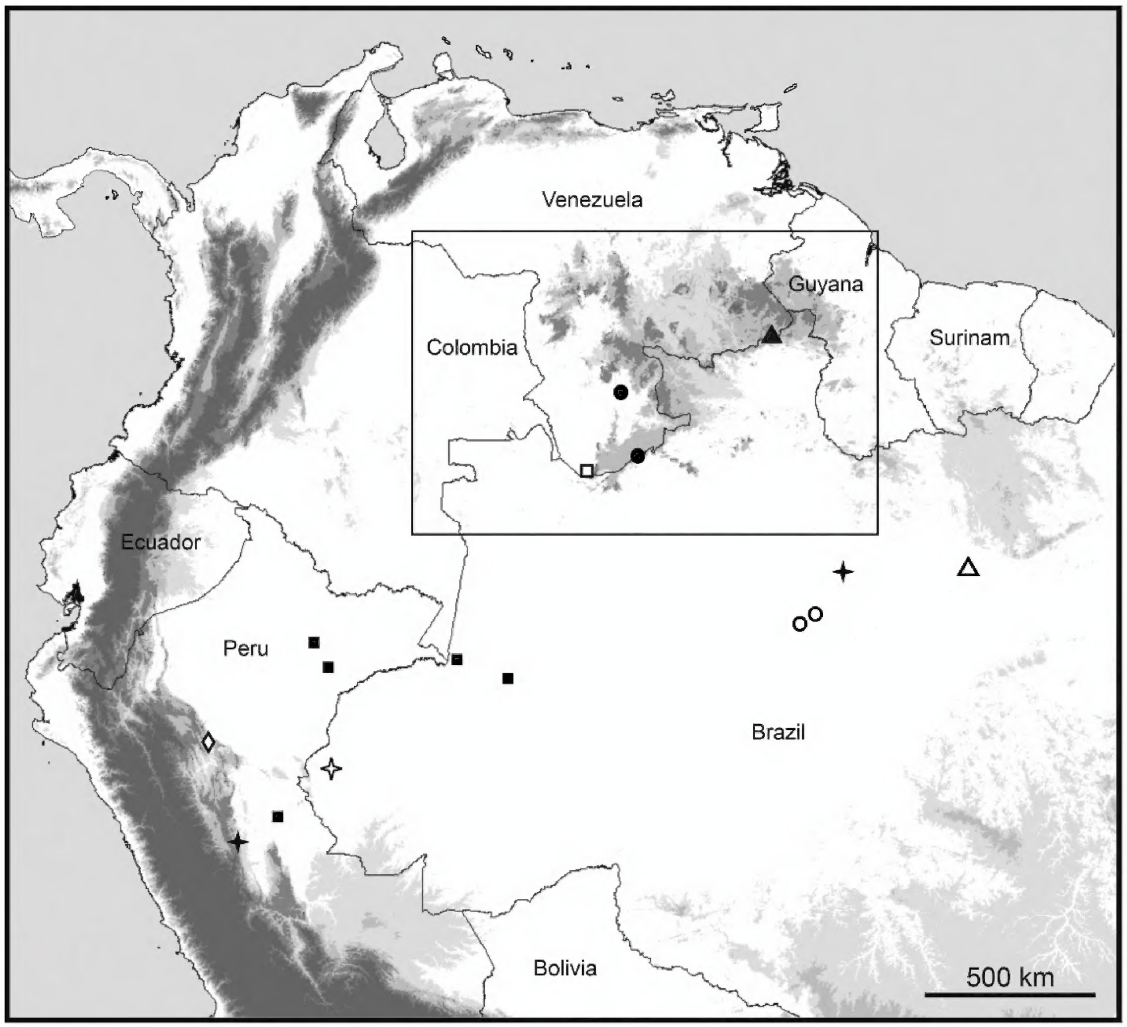

Fig. 1. Distribution of *Chactopsis* Kraepelin, 1912, plotting known locality records in Brazil, Peru, and Venezuela. *Chactopsis amazonica* Lourenço and Francke, 1986, open circles; *Chactopsis barajuri* González-Sponga, 1982, solid triangle; *Chactopsis buhrnheimi* Lourenço, 2003, open star; *Chactopsis curupira*, n. sp., open triangle; *Chactopsis chullachaqui*, n. sp., open diamond; *Chactopsis insignis* Kraepelin, 1912, solid squares; *Chactopsis siapaensis* González-Sponga, 1991, open square; *Chactopsis sujirima* González-Sponga, 1982, solid circles; undetermined *Chactopsis* species, solid stars. Box indicates area mapped in figure 2.

The present contribution aims to revise the taxonomy of *Chactopsis* and test the relationships among the species currently assigned to it in a cladistic analysis of morphological characters, not to address its phylogenetic position per se. New diagnoses are presented for all previously described species, most of which have not been revised since their original description. The trichobothrial pattern is reinterpreted and the hemispermatophore described for the first time. *Chactopsis* is restricted to eight species (table 1), two of which are new: *Chactopsis chullachaqui*, n. sp., from Peru and *Chactopsis curupira*, n. sp., from Brazil. *Chactopsis insignis* is redescribed and supplementary data on pedipalp trichobothria and hemispermatophore (where known) provided for *C. amazonica*, *C. barajuri*, *C. buhrnheimi*, *C. siapaensis* and *C. sujirima*. Two new genera are created to accommodate the remaining species, formerly assigned to *Chactopsis*,

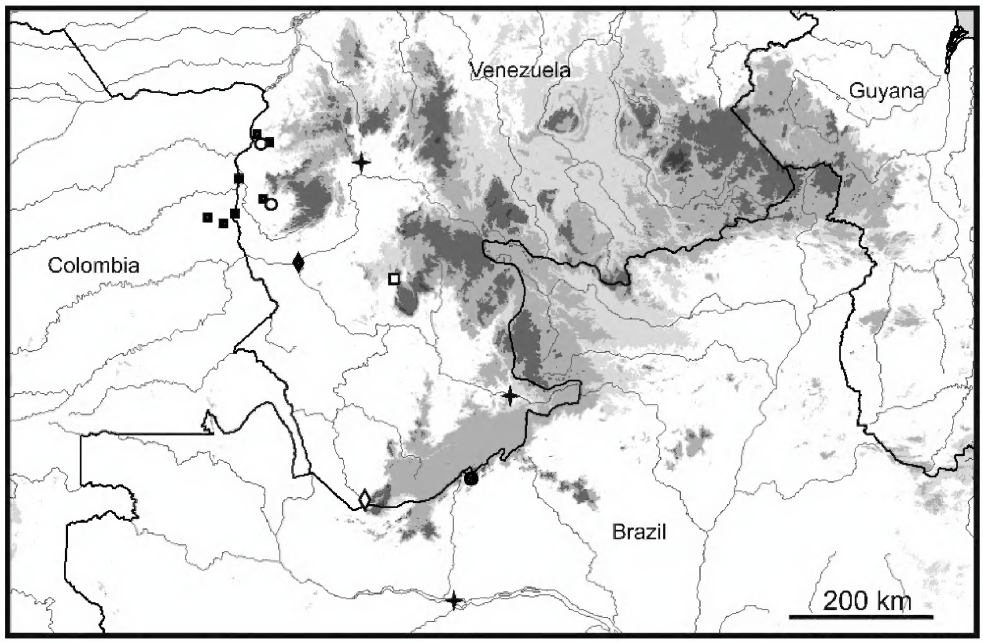

Fig. 2. Distribution of *Chactopsoides*, n. gen., and *Megachactops*, n. gen., plotting known locality records in Brazil, Colombia, and Venezuela. *Chactopsoides anduzei* (González-Sponga, 1982), n. comb., solid squares; *Chactopsoides gonzalezspongai*, n. sp., solid diamond; *Chactopsoides marahuacaensis* (González-Sponga, 2004), n. comb., open square; *Chactopsoides yanomami* (Lourenço et al., 2011), n. comb., solid circle; *Megachactops coriaceo* (González-Sponga, 1991), n. comb., open diamond; *Megachactops kuemoi*, n. sp., open circle; undetermined *Chactopsoides* species, solid stars.

based on the cladistic analysis. *Chactopsoides*, n. gen., accommodates *Chactopsoides anduzei* (González-Sponga, 1982), n. comb. (type species), *Chactopsoides marahuacaensis* (González-Sponga, 2004), n. comb., *Chactopsoides gonzalezspongai*, n. sp., from Venezuela, and *Chactopsoides yanomami* (Lourenço et al., 2011), n. comb., recently described from the upper Rio Negro in Brazilian Amazonia (table 1). *Chactopsoides anduzei*, n. comb., is redescribed and *C. carolinae* synonymized with it. Supplementary data on pedipalp trichobothria are provided for *C. marahuacaensis*, n. comb. *Megachactops*, n. gen., accommodates *Megachactops coriaceo* (González-Sponga, 1991), n. comb., and *Megachactops kuemoi*, n. sp. (type species), from Venezuela. Supplementary data on pedipalp trichobothria and hemispermatophore are provided for *M. coriaceo*, n. comb. A key to the identification of the species of *Chactopsis*, *Chactopsoides*, n. gen., and *Megachactops*, n. gen., is provided, their morphology illustrated, and distribution records mapped.

Material and Methods

Material Examined: Most material reported here was collected during several field expeditions in recent years. Personally collected material was captured in pitfall traps or by ultraviolet (UV) light detection (Stahnke, 1972) at night, using Maglite® 3D flashlights retrofitted with UV LEDs.

Material is deposited in the following collections: American Museum of Natural History, New York, (AMNH); Instituto Alexander von Humboldt, Villa de Leyva, Colombia (IAvH); Instituto Nacional de Pesquisas da Amazônia, Manaus, Brazil (INPA); Manuel A. González-Sponga Private Collection, Caracas, Venezuela (MAGS), currently hosted at the Museo del Instituto de Zoología Agrícola, Maracay, Venezuela (MIZA); Museo de Ciencias Naturales de

Fig. 3. *Chactopsis* Kraepelin, 1912, habitat. **A.** Reserva Ducke, Manaus, Amazonas, Brazil, habitat of *Chactopsis amazonica* Lourenço and Francke, 1986. **B.** Guacamayo, Tarapoto, San Martín Department, Peru, habitat of *Chactopsis chullachaqui*, n. sp. **C.** Tahuayo River, Loreto Department, Peru, habitat of *Chactopsis insignis* Kraepelin, 1912.

Caracas, Venezuela (MCNC); Museo de Historia Natural, Universidad Nacional de San Antonio Abad del Cusco, Peru (MHNC); Museo de Historia Natural La Salle, Caracas, Venezuela (MHNLS); Muséum National d'Histoire Naturelle, Paris, France (MNHN); Museu Nacional do Rio de Janeiro, Brazil (MNRJ); Museu Paraense Emílio Goeldi, Belém, Brazil (MPEG); Museo de Biologia de la Universidad Central de Venezuela, Caracas (MBUCV); Museu de Zoologia, Universidade de São Paulo, Brazil (MZSP);

Fig. 4. *Chactopsoides*, n. gen., and *Megachactops*, n. gen., habitat. **A.** Autana, Amazonas, Venezuela, habitat of *Chactopsoides anduzei* (González-Sponga, 1982), n. comb., and *Megachactops kuemoi*, n. sp. **B.** Isla Piñate, confluence of Orinoco and Ventuari rivers, Amazonas, Venezuela, habitat of *Chactopsoides gonzalezspongai*, n. sp.

U.S. National Museum of Natural History, Smithsonian Institution, Washington, DC (USNM). Type material was examined for all species, except the holotypes of *C. insignis* and *C. yanomami*.

CHARACTERS: Measurements (mm) were recorded with an ocular micrometer using a Leica MZAPO stereomicroscope. Morphological terminology follows Prendini et al. (2003) for carapace surfaces and Vachon

Fig. 5. *Chactopsis* Kraepelin, 1912, *Chactopsoides*, n. gen., and *Megachactops*, n. gen., habitus in life. **A, B.** *Chactopsis amazonica* Lourenço and Francke, 1986, Reserva Ducke, Manaus, Amazonas, Brazil. **A.** ♂. **B.** ♀. **C.** *Chactopsoides anduzei* (González-Sponga, 1982), n. comb., ♂, Isla Ratón, Amazonas, Venezuela. **D.** *Chactopsoides gonzalezspongai*, n. sp., ♂, Isla Piñate, Amazonas, Venezuela. **E.** *Chactopsis insignis* Kraepelin, 1912, ♂, Tahuayo River, Loreto Department, Peru. **F.** *Megachactops kuemoi*, n. sp., ♀, Tobogan del Cuao, Amazonas, Venezuela.

TABLE 1
Currently Recognized Species of *Chactopsis* Kraepelin, 1912, and Related Genera with Countries and States (Brazil, Venezuela) or Departments (Colombia, Peru) in which Recorded

Chactopsis Kraepelin, 1912	
Chactopsis amazonica Lourenço and Francke, 1986	Brazil: Amazonas
Chactopsis barajuri González-Sponga, 1982	Venezuela: Bolívar
Chactopsis buhrnheimi Lourenço, 2003	Brazil: Amazonas
Chactopsis chullachaqui, n. sp.	Peru: San Martín
Chactopsis curupira, n. sp.	Brazil: Pará
Chactopsis insignis Kraepelin, 1912	Brazil: Amazonas Peru: Loreto, Ucayali
Chactopsis siapaensis González-Sponga, 1991	Venezuela: Amazonas
Chactopsis sujirima González-Sponga, 1982	Brazil: Amazonas, Venezuela: Amazonas
Chactopsoides, n. gen.	
Chactopsoides anduzei (González-Sponga, 1982), n. comb.	Colombia: Vichada Venezuela: Amazonas
Chactopsoides gonzalezspongai, n. sp.	Venezuela: Amazonas
Chactopsoides marahuacaensis (González-Sponga, 2004), n. comb.	Venezuela: Amazonas
Chactopsoides yanomami (Lourenço et al., 2011), n. comb.	Brazil: Amazonas
Megachactops, n. gen.	
Megachactops coriaceo (González-Sponga, 1991), n. comb.	Venezuela: Amazonas
Megachactops kuemoi, n. sp.	Venezuela: Amazonas

(1952) and Prendini (2000) for pedipalp carinae, abbreviated as follows: digital (D), dorsal patellar process (DPP), dorsal secondary (DS), dorsoexternal (DE), dorsointernal (DI), dorsomarginal (DMA), dorsomedian (DM), external (E), externomedian (EM), internomedian (IM), subdigital (SD), ventral patellar process (VPP), ventroexternal (VE), ventrointernal (VI), ventromedian (VM). A modified version of Prendini's (2003) terminology for tergal, sternal, and metasomal carinae, used by Ochoa et al. (2010), is abbreviated as follows: dorsolateral (DL), dorsosubmedian (DSM), lateral supramedian (LSM), lateral median (LM), lateral inframedian (LIM), ventrolateral (VL), ventrosubmedian (VSM), ventromedian (VM). The terminology of Stahnke (1970) is used for other characters, except trichobothrial notation, which is described further below.

Hemispermatophores were dissected in ethanol and separated from the surrounding tissues. Illustrations of hemispermatophores were produced with a camera lucida fitted to a Leica MZ-APO stereomicroscope. Digital images of habitus were taken under visible light using a Canon EOS camera. Digital images of external morphology were taken under UV light using a Microptics™ ML-1000 digital imaging system or a Leica DFC290 digital camera, attached to a Leica M125 stereomicroscope. In order to produce a single composite montage, up to 30 images were taken, depending on the structure, and the focal planes fused using CombineZM (©Alan Hadley, 2008; http://hadleyweb.pwp.blueyonder.co.uk) or the automated montage system of the Leica M125 stereomicroscope.

Cladistic Analysis: A cladistic analysis of morphological characters for *Chactopsis* and related genera was performed in order to test the monophyly of the group and evaluate the relationships among its species. All previously described species of *Chactopsis*, except *C. yanomami* (the known specimens of which were unavailable for study and the original description of which was insufficiently detailed to score the morphological character matrix), were included as ingroup taxa (table 1). The outgroup taxon sample comprised seven exemplar species of Chactoidea Pocock, 1893, each representing a different genus. The four most diverse Neotropical chactid genera were represented by the following exemplar species: *Broteochactas gollmeri* (Karsch, 1879); *Brotheas amazonicus* Lourenço, 1988; *Chactas vanbenedenii* (Gervais, 1843); *Teuthraustes atramentarius* Simon, 1878. *Euscorpius flavicaudis* (DeGeer, 1778) and a species of *Megacormus* Karsch,

TABLE 2
Morphological Character Matrix for Cladistic Analysis of *Chactopsis* Kraepelin, 1912, and Related Genera.
Character states scored 0–4, ? (unknown) or - (inapplicable). Refer to appendix 1 for character descriptions and appendix 2 for additional material examined

Iurus kinzelbachi	00010311110020000000000010-00111111120000011003100111031000100
Euscorpius flavicaudis	21001001200010001100302210-10211112100101-00103003113031000000
Chactas vanbenedenii	11001011111000001000100010-10211111110101-12103?1-113031000000
Teuthraustes atramentarius	21101011011000001001100010-10211111110000011011311-113031000000
Megacormus sp.	10011201200000011110202210-00211111110000101101003113031100100
Brotheas amazonicus	21111011011010001000201010-10211100120000010112102110011001100
Broteochactas gollmeri	21001011011010001001201010-10211100110100012112102110011001100
Chactopsis amazonica	11101111012101121110211110110000000001010010111001111010110100
Chactopsis barajuri	11101111012101121110212110110000000001010010111001111010110100
Chactopsis buhrnheimi	11101111012101121110211110110000000001010010111??????????????
Chactopsis chullachaqui	11101011012101121110211110110100000001010010111000111001210100
Chactopsis insignis	11101111012101121110211110110000000001010010111000111001210100
Chactopsis curupira	11101111012101121110211110110100000001010010111001111010110100
Chactopsis siapaensis	11101111012101121110211110110000000001010010111000111001210100
Chactopsis sujirima	10101111011101121110111110110100000001020010111??????????????
Chactopsoides anduzei	11101111012101121110211101011100000001010010111104012121100110
Chactopsoides gonzalezspongai	11101111012101121110211101011100000001010010111104012121100110
Chactopsoides marahuacaensis	11101111012101121110211101011100000001010010111??????????????
Megachactops coriaceo	00101110111001121110201101000100000101000101100001-100001120101
Megachactops kuemoi	00101110110001121110201101000100000101100101000001-100001120101

1881, represented Palearctic and Neotropical euscorpiids, respectively. The tree was rooted on a Palearctic iurid, *Iurus kinzelbachi* Kovařík et al., 2010. The data matrix comprised 62 characters, 16 from genitalic (hemispermatophore) morphology and 46 from somatic morphology (table 2; appendix 1). All characters were unordered.

Analyses were conducted with TNT 1.1 (Goloboff et al., 2008; available at http://www.zmuc.dk/public/phylogeny/TNT/). Heuristic search strategies were performed using traditional search with 100 random-addition sequences (Wagner trees) followed by tree bisection-reconnection (TBR) branch swapping, keeping up to 10 trees per replication, with the command sequence: hold 1000; mult=tbr replic 100 hold 10;. All trees found during searches were collapsed under "rule 1" (minimum possible length is zero; Coddington and Scharff, 1994). The data matrix was analyzed under implied weights (IW; Goloboff, 1993). The sensitivity of results was assessed by varying the concavity constant, *k* from 1–15 (Prendini, 2000) with the command Piwe = N, where N is the *k* value. Characters were optimized with accelerated transformation (ACCTRAN) (Farris, 1970) in WinClada 1.00.08 (Nixon, 1999–2002). Unambiguous optimizations were produced with TNT (command: apo-).

Distribution Maps: Point locality records were georeferenced in the field with portable global positioning system devices (Garmin® GPS V) or retroactively using the GeoNet Names Server (http://earth-info.nga.mil/gns/html). Retroactive georeferences are indicated in square brackets in the list of materials examined. A distribution map was generated using DIVA-GIS Version 5.4 (http://www.diva-gis.org) by superimposing georeferenced point locality records on a spatial dataset depicting the political boundaries and topography of northern South America. The topographic coverage (as a shaded relief) was generated using digital elevation model files (ca. 90 m resolution) from the CGIAR Consortium for Spatial Information (http://srtm.csi.cgiar.org).

On the Phylogeny of *Chactopsis* and Related Genera

Chactopsis was originally placed in Chactidae Pocock, 1893, by Kraepelin (1912), where it remained for nearly a century (Sissom, 1990, 2000; Lourenço, 2000, 2001). Its placement in Chactidae, and close rela-

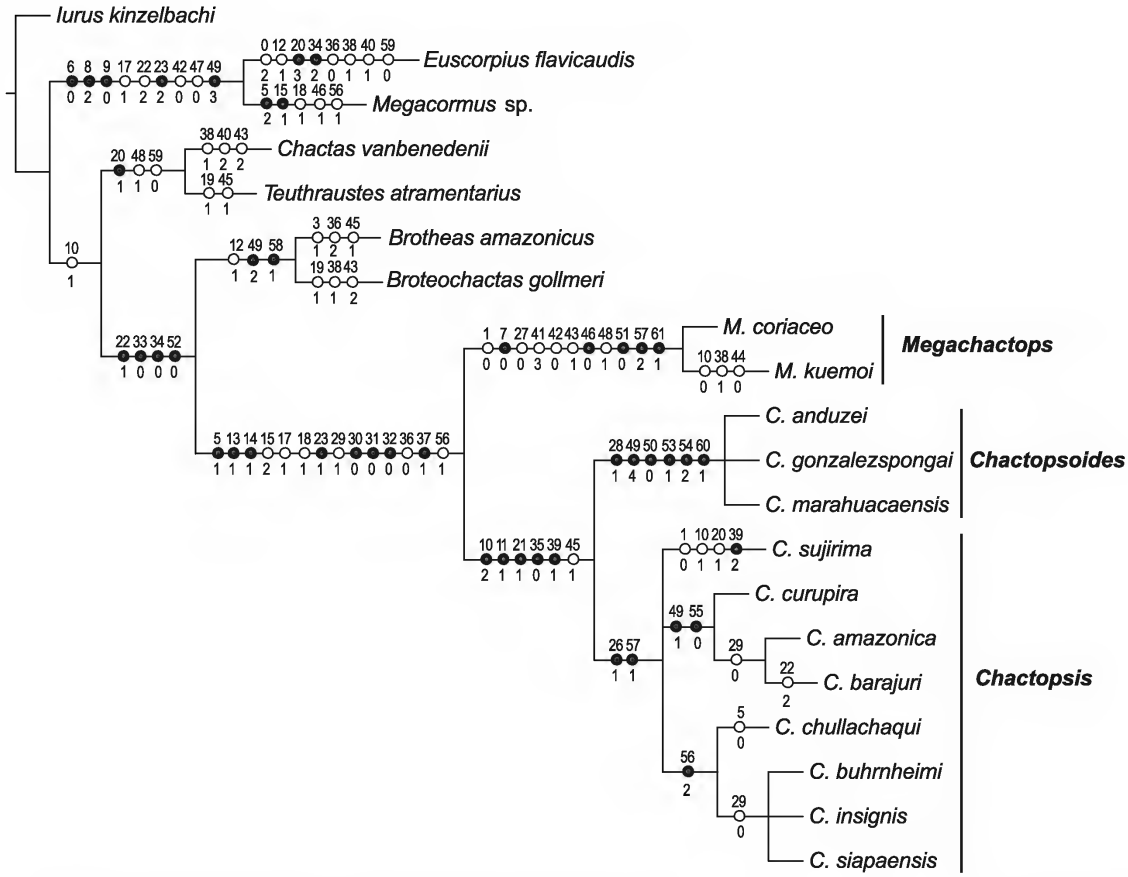

Fig. 6. Most parsimonious tree obtained by cladistic analysis of 62 morphological characters for 13 species of *Chactopsis* Kraepelin, 1912, *Chactopsoides*, n. gen., *Megachactops*, n. gen., and relevant outgroup taxa, under implied weights with $k = 6$ (length = 138). Characters optimized with accelerated transformation. Homoplasious and nonhomoplasious characters respectively indicated by white and black circles, character numbers above and character states below.

tionship to the Neotropical members of that family, was suggested in an unpublished cladistic analysis (Stockwell, 1989). In an unprecedented move, Soleglad and Sissom (2001) transferred the genus to Euscorpiidae Laurie, 1896, creating a unique tribe Chactopsini Soleglad and Sissom, 2001, to accommodate it in subfamily Megacorminae Kraepelin, 1899. Unfortunately, the cladistic analysis on which this transfer was based, included insufficient Neotropical chactid taxa to adequately test the phylogenetic position of *Chactopsis*, omitted important characters (e.g., hemispermatophore), and was severely flawed in many other respects (Prendini and Wheeler, 2005). The dubious placement of *Chactopsis* was uncritically adopted by Soleglad and Fet (2003b) and Fet and Soleglad (2005), who continue to regard *Chactopsis* as a euscorpiid, in spite of evidence to the contrary (Lourenço, 2003, 2005; Coddington et al., 2004; Prendini and Wheeler, 2005; Flórez and Mattoni, 2007; Botero-Trujillo, 2008; Prendini, 2009; Lourenço et al., 2011).

Although not intended to resolve the phylogenetic position of *Chactopsis*, the cladistic analysis presented here nevertheless improves upon previous attempts by scoring exemplar species representing four genera of Neotropical Chactidae and two genera of Euscorpiidae, in addition to the majority of species in *Chactopsis* and related genera, and by including a large number of new characters, including 16 characters of the hemi-

spermatophore omitted from previous analyses (table 2; appendix 1).

The monophyly of *Chactopsis* and the two new genera described in this contribution is unequivocal. The cladistic analysis presented here obtained six most parsimonious trees of 138 steps (fig. 6). The topology was stable under a range of weighting intensities (k = 1−15). Except for a few terminal branches that collapsed in the strict consensus, the major clades were maintained. *Chactopsoides*, n. gen., and *Megachactops*, n. gen., were consistently monophyletic and respectively supported by six and 11 unambiguous synapomorphies. *Chactopsoides*, n. gen., consistently grouped sister to *Chactopsis*, forming a monophyletic group supported by six unambiguous synapomorphies. Two monophyletic groups were recovered within *Chactopsis* in most analyses: (*C. curupira* (*C. amazonica* + *C. barajuri*)) and (*C. chullachaqui* (*C. buhrnheimi* + *C. insignis* + *C. siapaensis*)). The position of *C. sujirma* was unresolved, however, due to the presence of missing entries in 16 characters of the hemispermatophore, which could not be scored because the male of this species is currently unknown.

The cladistic analysis also confirms the findings of two previous analyses (Stockwell, 1989; Flórez and Mattoni, 2007) that *Chactopsis* (and the two new genera described here) is more closely related to the Neotropical Chactidae, and falsifies the monophyly of Euscorpiidae as currently defined. Nevertheless, a more extensive analysis, including a broader sample of Euscorpiidae and Neotropical Chactidae, representing all genera currently assigned to these families, as well as other chactoid genera, is required to more precisely determine the position of *Chactopsis* and its relatives, and implement formal taxonomic changes.

On the Trichobothrial Pattern of *Chactopsis* and Related Genera

The unusual trichobothrial pattern of *Chactopsis* and the two new genera described below, unique among scorpions, was categorised as neobothriotaxic major Type C by Vachon (1974). As with other deviations from the "fundamental" Type C pattern, Vachon (1974) explained the drastically different positions of particular trichobothria in *Chactopsis* (e.g., *Db* and *Dt*, situated distally on the pedipalp chela fixed finger rather than on the chela manus as in most other scorpions with a Type C trichobothrial pattern) as the result of a "migration" process from the base of the manus to the distal half of the fixed finger (fig. 7). However, the assumption of trichobothrial "migration," invoked to account for such positional differences between putatively homologous trichobothria, has been repeatedly questioned (Lamoral, 1979; Francke and Soleglad, 1981; Francke, 1982; Stockwell, 1989; Sissom, 1990; Prendini, 2000; Prendini and Wheeler, 2005; Prendini et al., 2006; Francke and Prendini, 2008; Vignoli and Prendini, 2009; Prendini et al., 2010). There is neither evidence nor a plausible explanation for migration, accounting for movement of the trichobothria and their associated bipolar neurons, whereas there is abundant evidence for the loss or gain of trichobothria. Although minor differences in the relative positions of putatively homologous trichobothria can be explained by changes in the shape or length, including allometry, of the pedipalp segments on which they occur, the loss or gain of trichobothria is a more plausible explanation than "migration" for these drastic differences in position (Prendini, 2000; Prendini and Wheeler, 2005; Prendini et al., 2010).

González-Sponga (1982, 1991, 1996) applied Vachon's (1974) notation without modification to the trichobothria of the pedipalp femur and chela of *Chactopsis*, but proposed several modifications for those on the external surface of the patella. Whereas Vachon (1974) designated six *eb*, three *esb*, and five *est* trichobothria on the external surface of the patella, González-Sponga (1982, 1991, 1996) designated five *eb*, four *esb*, and six *est* trichobothria (table 3). Four trichobothria were assigned to different territories: est_6 was designated et_6; em_1, est_5; esb_1, em_1 or em_2; and eb_5, esb_2. Soleglad and Sissom (2001) largely followed Vachon's (1974) interpretation for the femur and chela, but proposed three *em* and five *est* trichobothria on the external surface of the patella, instead of two *em* and six *est* trichobothria as

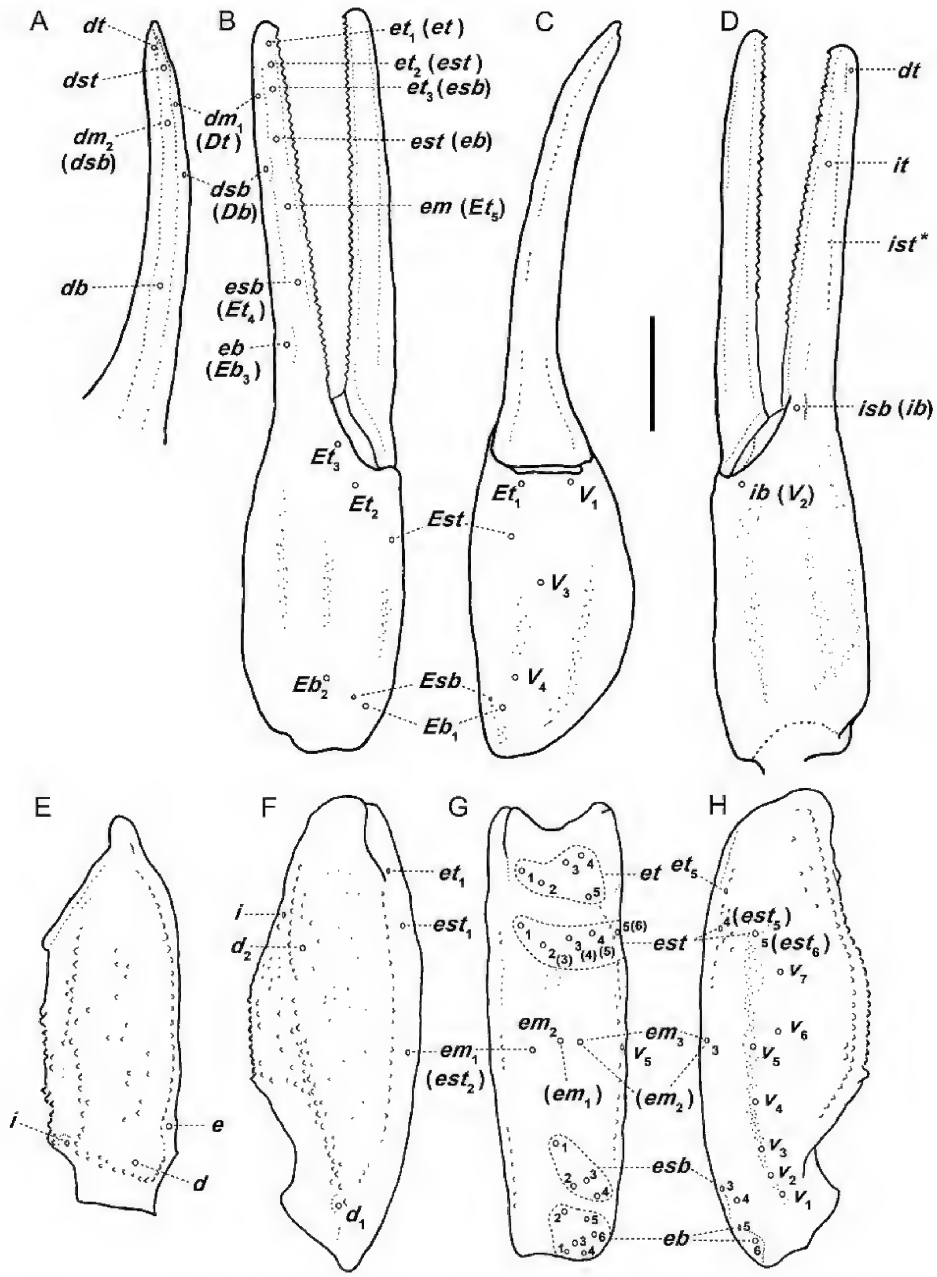

Fig. 7. *Chactopsis insignis* Kraepelin, 1912, dextral pedipalp segments showing reinterpretation of trichobothrial pattern proposed in present contribution, with corresponding terminology from Vachon (1974) in parentheses. *Trichobothium *ist* absent in *Chactopsis* Kraepelin, 1912, present in *Chactopsoides*, n. gen., and *Megachactops*, n. gen. **A.** Chela fixed finger. **B–D.** Chela manus. **E.** Femur. **F–H.** Patella. **A, E, F.** Dorsal aspect. **B, G.** External aspect. **C, H.** Ventral aspect; **D.** Internal aspect. Annotations: ***d,*** dorsal; ***db, Db,*** dorsal basal; ***dm,*** dorsal medial; ***dsb,*** dorsal suprabasal; ***dst,*** dorsal subterminal; ***dt, Dt,*** dorsal terminal; ***e,*** external; ***eb, Eb,*** external basal; ***em,*** external medial; ***esb, Esb,*** external suprabasal; ***est, Est,*** external subterminal; ***et, Et,*** external terminal; ***i,*** internal; ***ib,*** internal basal; ***isb,*** internal subbasal; ***ist,*** internal subterminal; ***it,*** internal terminal; ***v, V,*** ventral. Scale bar = 1 mm.

TABLE 3

Trichobothrial Notation of Pedipalp Femur and Patella in *Chactopsis* Kraepelin, 1912, and Related Genera. Interpretations of Vachon (1974), González-Sponga (1982, 1996) and Soleglad and Sissom (2001) provided for comparison with interpretation in current article. Trichobothria not recognized in previous publications indicated with x

		This article	Vachon	González-Sponga	Soleglad and Sissom
Femur	Internal surface	*i*	–	–	–
	Dorsal surface	*d*	–	–	–
	External surface	*e*	–	–	–
Patella	Internal surface	*i*	–	–	–
	Dorsal surface	d_1	–	–	–
		d_2	–	–	–
	External surface	et_1	–	–	–
		et_2	–	–	–
		et_3	–	–	–
		et_4	–	–	–
		et_5	–	–	–
		est_1	–	–	–
		est_2	est_3	–	est_2
		est_3	est_4	–	est_3
		est_4	est_5	est_6	est_4
		est_5	est_6	et_6	est_5
		em_1	est_2	–	em_1
		em_2	em_1	est_5	em_2
		em_3	em_2	–	em_3
		em_4	x	em_2	em_4
		esb_1	–	em_1 *or* em_2	esb_1
		esb_2	–	esb_1	esb_2
		esb_3	–	–	–
		esb_4	x	esb_4	eb_7
		eb_1	–	–	–
		eb_2	–	–	–
		eb_3	–	–	–
		eb_4	–	eb_5	eb_4
		eb_5	–	esb_2	eb_5
		eb_6	–	eb_4	eb_6
	Ventral surface	v_1	–	–	–
		v_2	–	–	–
		v_3	–	–	–
		v_4	–	–	–
		v_5	–	–	–
		v_6	–	–	–
		v_7	–	–	–

in Vachon's (1974) interpretation. Botero-Trujillo (2008) followed González-Sponga's (1982, 1991, 1996) interpretation.

In the present contribution, we present a reinterpretation of the trichobothrial pattern of *Chactopsis* and related genera (fig. 7; tables 3, 4), applying the "placeholder approach" of Prendini et al. (2010). According to this interpretation, six trichobothria are absent on the pedipalp chela manus (*Db*, *Dt*, Eb_3, Et_4, Et_5, and V_2) and six "accessory" trichobothria are present on the fixed finger (dm_1, dm_2, et_2, et_3, *em*, and *isb* or *ist*) of *Chactopsis* and related genera. We adopt Soleglad and Sissom's (2001) interpretation of the trichobothria on the pedipalp patella of *Chactopsis*, except that trichobothrium eb_7 is interpreted as esb_4. The trichobothrial notation used in this contribution does not necessarily imply homology with other scor-

TABLE 4
Trichobothrial Notation of Pedipalp Chela in *Chactopsis* Kraepelin, 1912, and Related Genera.
Interpretations of Vachon (1974), González-Sponga (1982, 1996) and Soleglad and Sissom (2001) provided for comparison with interpretation in current article. Trichobothria not recognized in previous publications indicated with x

		This article	Vachon	González-Sponga	Soleglad and Sissom
Finger	Internal surface	*it*	–	–	–
		ist	x	*ib*	x
		isb	*ib*	–	–
		ib	V_2	–	–
	Dorsal surface	*dt*	–	–	–
		dst	–	–	–
		dm_1	*dt*	–	–
		dm_2	*dsb*	–	–
		dsb	*db*	–	–
		db	–	–	–
	External surface	et_1	*et*	–	–
		et_2	*est*	–	–
		et_3	*esb*	–	–
		Est	*eb*	–	–
		Em	Et_5	–	–
		Esb	Et_4	–	–
		Eb	Eb_3	–	–
Manus	External surface	Et_1	–	–	–
		Et_2	–	–	–
		Et_3	–	–	–
		Est	–	–	–
		Esb	–	–	–
		Eb_1	–	–	–
		Eb_2	–	–	–
	Ventral surface	V_1	–	–	–
		V_3	–	–	–
		V_4	–	–	–

pion taxa (i.e., trichobothria with the same designation in different taxa are not necessarily homologous).

SYSTEMATICS

Family Chactidae Pocock, 1893

Key to the Species of *Chactopsis* and Related Genera*

1. Carapace, median carinae present, anterior margin with conspicuous median notch (fig. 64); pedipalp patella, DM carinae present, DPP prominent (fig. 74B); patellar trichobothria v_6 and v_7 aligned with v_1–v_5 and situated close to VE carina (figs. 70D, 74D); chela trichobothrium *db* situated medially on fixed finger (fig. 71B), V_3 situated in distal third of manus, closer to V_1 than to V_4 (fig. 71D); metasomal segment IV, VSM carinae incomplete, VM carina present medially (fig. 68); metasomal segment V, ML carinae occupy less than half length of segment (fig. 67); hemispermatophore apex short and subtriangular, lobe region well developed, occupying third of length, dorsal apophysis absent, ental lobe elongated, median lobe auriculate, almost apapillose, and dorsal margin with row of small spines medially (figs. 72, 76) . . . . 2 (*Megachactops*, n. gen.)
– Carapace, median carinae absent, anterior margin with moderate to shallow median notch (figs. 10, 11, 45); pedipalp patella, DM carinae absent, DPP weakly developed (figs. 24B, 33B, 55B); patellar trichobothria v_6 and v_7 not aligned with v_1–v_5 and situated submedially (figs. 24D, 33D, 55D); chela trichobothrium *db* situated in proximal third of fixed finger (figs. 25B, 56B), V_3 situated medially on manus, equidistant between V_1 and V_4 (figs. 25D, 56D); metasomal segment IV, VSM carinae complete, VM carina absent (figs. 18, 47C); metasomal segment V, ML

carinae occupy more than half length of segment (figs. 15–17); hemispermatophore apex elongated, lobe region reduced to one-fifth of length, dorsal apophysis present, ental lobe small or absent, median lobe usually papillose, dorsal margin without row of spines (figs. 8, 57) 3

2. Carapace surface finely and densely granular throughout in ♂ and ♀ (fig. 64A, B); ventral intercarinal surfaces of metasomal segments I–V densely granular (fig. 68A), DSM carinae present on metasomal segments I–III (fig. 66) . . . . . *Megachactops coriaceo*, n. comb.

– Carapace surface coarsely granular, some areas smooth and punctate (♀ less granular than ♂) (fig. 64C, D); ventral intercarinal surfaces of metasomal segments I–V smooth (fig. 68B), DSM carinae absent on metasomal segments I–III. . . . . *Megachactops kuemoi*, n. sp.

3. Pedipalp chela trichobothrium *isb* absent, *ist* present, Et_1 situated proximal to Et_2, dm_1 situated distal to et_3 (fig. 56); hemispermatophore slender, flagellum slightly undulated, not curved, ental fold absent, trunk elongated, sheath-shaped portion more than two-thirds length of trunk, median longitudinal sulcus present, foot almost entire length of trunk, lobe region with single lobe, ental lobe absent, median lobe reduced, dorsal apophysis laminar or folded (figs. 57, 61) . . . . . 4 (*Chactopsoides*, n. gen.)

– Pedipalp chela trichobothrium *ist* absent, *isb* present, Et_1 and Et_2 situated in same axis, dm_1 situated proximal to, or in same axis as et_3 (fig. 25); hemispermatophore broad, flagellum curved or straight, ental fold present, pronounced on ental margin, trunk well developed, moderately or strongly tortuous medially, sheath-shaped portion half to less than half length of trunk, median longitudinal sulcus absent, foot less than half length of trunk, lobe region with two lobes, ental lobe slightly sclerotized, forming projection toward ental side, median lobe well developed, dorsal apophysis forming sclerotized projection (figs. 8, 26, 29, 38, 41, 44). . . . . 6 (*Chactopsis*)

4. Carapace surfaces mostly smooth, sparsely granular near anterior margin, nongranular surfaces punctate (fig. 45E); metasomal segment II, VSM carinae obsolete, segments III and IV, VSM carinae complete, granular (fig. 49B); pedipalp chela, ventral and external surfaces mostly smooth, nongranular surfaces slightly punctate (fig. 63B, C) . . . . . *Chactopsoides marahuacaensis*, n. comb.

– Carapace surfaces finely to coarsely granular, especially anteriorly and laterally (fig. 45A–D); metasomal segments II–IV, VSM carinae complete, granular (figs. 47C, 48A); pedipalp chela, ventral and external surfaces sparsely granular, nongranular surfaces punctate (figs. 56A, C, D, 60A, C, D) 5

5. Metasomal segments II–IV, each with two complete pigmentation stripes (paired VL), VM stripe restricted to anterior half; metasomal segments II and III, LIM carinae present in anterior third (fig. 47B); pedipalp chela, DMA carina costate on fixed finger only; pedipalp chelal trichobothrium *db* situated slightly proximal to *esb* (fig. 56); pedipalp chela length/width ratio, 4.43–4.82, mean = 4.59 (♂), 4.21–4.67, mean = 4.54 (♀); telson vesicle, length/height ratio, 3.22–3.75, mean = 3.53 (♂), 3.40–3.85, mean = 3.59 (♀); hemispermatophore lamina 15%–20% shorter than trunk, sheath-shaped portion occupyping 80% of trunk (fig. 57). . . . . *Chactopsoides anduzei*, n. comb.

– Metasomal segments II–IV, each with three complete pigmentation stripes (single VM and paired VL); metasomal segments II and III, LIM carinae absent in anterior third (fig. 48A); pedipalp chela, DMA carina costate in distal quarter of manus and on fixed finger; pedipalp chelal trichobothrium *db* situated equidistant between *esb* and *eb* (fig. 60); pedipalp chela length/width ratio, 4.00–4.58, mean = 4.31 (♂), 3.82–4.15, mean =3.97 (♀); telson vesicle length/height ratio, 2.72–3.28, mean = 2.98 (♂), 2.63–3.13, mean = 2.97 (♀); hemispermatophore lamina similar in length to trunk, sheath-shaped portion occupying two-thirds of trunk (fig. 61) . . . . . *Chactopsoides gonzalezspongai*, n. sp.

6. Tergites I–VI, each with distinct pair of carinae, progressively increasing in length (fig. 12B); metasomal segments I–IV, each with DL carinae more pronounced than other carinae (fig. 17B); pedipalp patella with 31 trichobothria. . . . . *Chactopsis sujirima*

– Tergites I–VI, each with vestigial pair of carinae (fig. 12A); metasomal segments I–IV, each with DL carinae similarly developed to other carinae (fig. 17A); pedipalp patella with 33 or 34 trichobothria 7

7. Hemispermatophore, lamina with flagellum straight, pedicel short, not reaching dorsal apophysis; ental fold situated subproximally, lobe region with additional concave fold, median lobe finely papillose on distal and dorsal surfaces, dorsal apophysis forming crest-shaped projection (figs. 26, 29, 38). . . 8

– Hemispermatophore, lamina with flagellum curved, pedicel elongated, reaching dorsal lobe, ental fold situated proximally, lobe

region without additional concave fold, median lobe densely papillose across entire surface, dorsal apophysis forming horn-shaped projection (figs. 8, 41, 44) 10

8. Pedipalp patella with four *em* trichobothria, trichobothrium est_2 situated proximal to, and distant from other *est* trichobothria, angle formed by trichobothria v_5–v_6–v_7 approximately 90° (fig. 27C, D); metasomal segment V, ML carinae extending almost 75% length of segment (fig. 15B); hemispermatophore, distal margin of median lobe unfolded (fig. 29C) . . . . . *Chactopsis barajuri*

– Pedipalp patella with three *em* trichobothria, trichobothrium est_2 situated slightly proximal to, or in same axis as trichobothria est_3 and est_4, angle formed by trichobothria v_5–v_6–v_7 greater than 90° (fig. 24C, D); metasomal segment V, ML carinae restricted to the anterior two-thirds of segment (fig. 15A); hemispermatophore, distal margin of median lobe moderately folded to ventral surface (figs. 26C, 38C). 9

9. Metasomal segment I, VSM carinae absent (fig. 18A); pedipalp chela trichobothrium *Est* situated closer to V_3 than to Et_1; hemispermatophore, median lobe without row of spines on distal margin, dorsal margin of dorsal apophysis smooth (fig. 26). . . . . *Chactopsis amazonica*

– Metasomal segment I, VSM carinae obsolete (fig. 19A); pedipalp chela trichobothrium *Est* situated equidistant between V_3 and Et_1; hemispermatophore, median lobe with conspicuous row of spines on distal margin, dorsal margin of dorsal apophysis bicuspid (fig. 38) . . . . . *Chactopsis curupira*, n. sp.

10. Cheliceral movable finger, ventral margin without subdistal tooth; pedipalp chela trichobothrium *Est* situated equidistant between V_3 and Et_1 (fig. 34C), patella trichobothrium esb_2 situated slightly proximal to esb_3 (fig. 33C); hemispermatophore, median lobe moderately extended ventrally, distal margin markedly folded to ventral surface (fig. 8). . . . . *Chactopsis chullachaqui*, n. sp.

– Cheliceral movable finger, ventral margin with subdistal tooth; pedipalp chela trichobothrium *Est* situated closer to V_3 than Et_1 (figs. 40D, 43D), patella trichobothrium esb_2 situated distal to esb_3 (figs. 39C, 42C); hemispermatophore, median lobe considerably extended ventrally, distal margin slightly folded to ventral surface (figs. 41, 44) . . . 11

11. Pedipalp chela fixed finger with three porous areas basally, between DMA and DI carinae, and two porous areas in position of DI carina (fig. 40); pectinal tooth count 9–10/10 (♂); telson, lateral surfaces smooth, ventral surfaces with few weak granules (♂); hemispermatophore, lamina similar in length to trunk, median trough well developed, median lobe densely papillose except along median trough (fig. 41). . . . . *Chactopsis insignis*

– Pedipalp chela fixed finger with two porous areas basally, between DMA and DI carinae, without porous areas in position of DI carina (fig. 43); pectinal tooth count 8/8 (♂); telson, lateral and ventral surfaces granular (♂); hemispermatophore, lamina longer than trunk, median trough weakly developed, median lobe entirely papillose on ental surface (fig. 44). . . . . *Chactopsis siapaensis*

*Remarks: *Chactopsis burnheimi*, known only from immatures, and *Chactopsoides yanomami*, n. comb., recently described from Brazil, are excluded from the key due to the uninformative diagnoses and illustrations in the original descriptions.

Chactopsis Kraepelin, 1912

Chactopsis Kraepelin, 1912: 86, 87, figs. 10–12 [type species by monotypy: *Chactopsis insignis* Kraepelin, 1912]; Birula, 1917: 163; Werner, 1934: 287; Mello-Leitão, 1942: 126; 1945: 116; Scorza, 1954a: 158; 1954b: 163; 1954c: 188, 198; Esquivel de Verde and Machado-Allison, 1969: 27, 31, 32; Bücherl, 1969: 769; 1971: 329; Vachon, 1974: 915, 935; Soleglad, 1976: 300; González-Sponga, 1977: 304, 309, 310; 1978: 22, 170, fig. 4; 1982: 127, 128; 1984a: 20, 53, 99; 1984b: 142, 144; Francke, 1985: 7, 16, 20; Lourenço and Francke, 1986: 550; Lourenço, 1988: 330; Sissom, 1990: 111, 113; González-Sponga, 1991: 13, 26; Nenilin and Fet, 1992: 12, 13; González-Sponga, 1996: 24–27, 110; Kovařik, 1998: 126; Lourenço, 1998: 133; Sissom, 2000: 310; Soleglad and Sissom, 2001: 25–88, 92, figs. 21, 79, 92, 106, 205, 207–215, tables 1, 2, 5, 6, 9, 10, 15; González-Sponga, 2001: 29, 40, 49; Lourenço, 2002a: 37, 41, 216, 222; 2002b: 404, 413, 428, 433, figs. 19, 33, 56, 63; 2003: 167, 168, fig. 14; Soleglad and Fet, 2003b: 35, 52, 61, 67, 94, 105, tables 3, 4, 9; 2004: 84; 2005: 6; Lourenço et al., 2005: 246; Prendini and Wheeler, 2005: 448, 464, 477, 478, 481; Fet and Soleglad, 2005: 1, 12; Fet et al., 2006: 7, 8; Graham and Fet, 2006: 2, 10, 11; Dupré, 2007: 4, 14, 16; Flórez and Mattoni, 2007: 83, 84; Rojas-Runjaic and de Sousa, 2007: 299, table I; Botero-Trujillo, 2008: 34; Flórez et al., 2008: 32; Soleglad et al., 2009: 3; Stockmann and Ythier, 2010: 41, 195, fig. 9c; Lourenço, et al., 2011: 65.

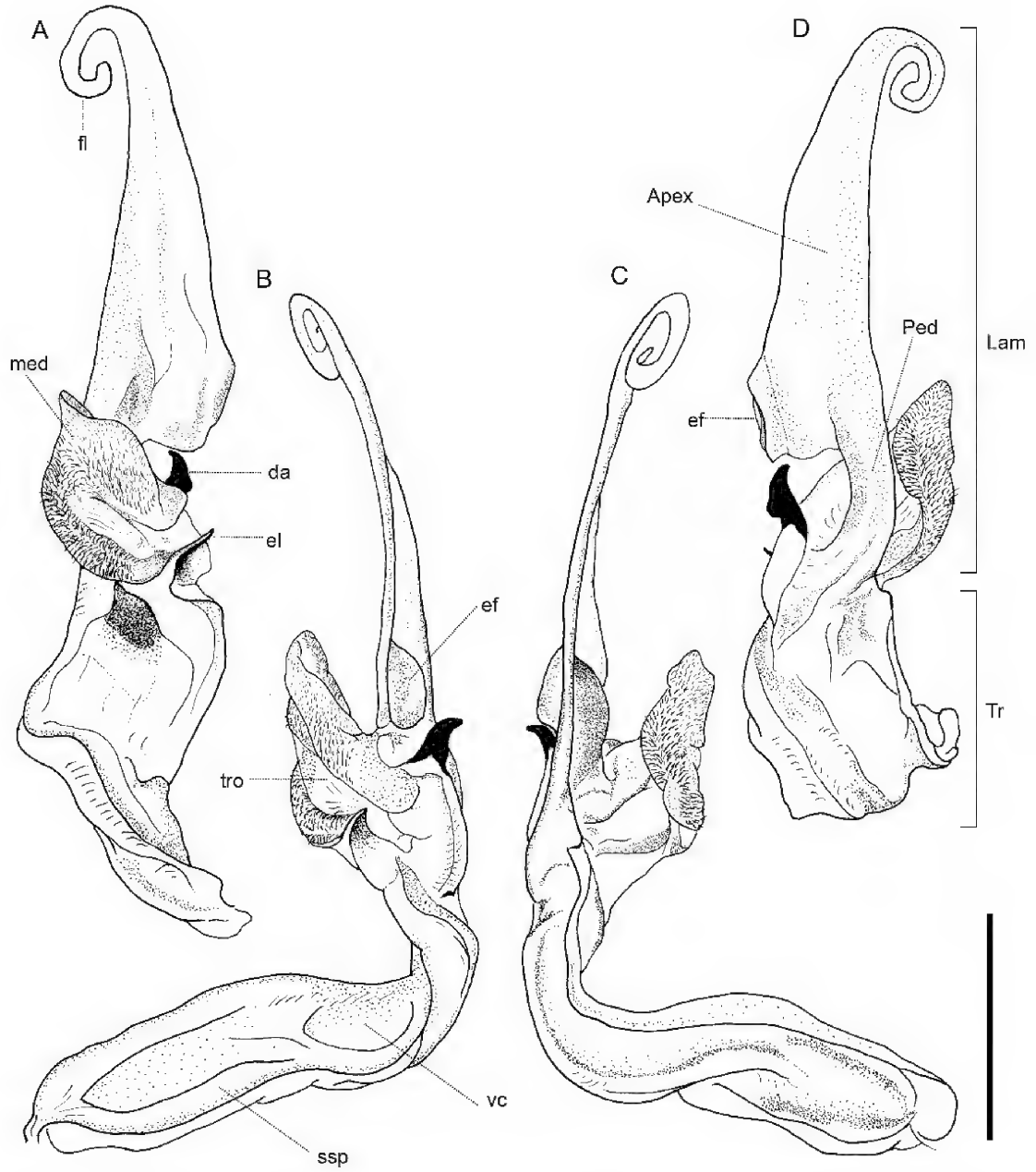

Fig. 8. *Chactopsis chullachaqui*, n. sp., holotype ♂ (MHNC), sinistral hemispermatophore showing morphological terminology. **A.** Ventral aspect. **B.** Ental aspect. **C.** Ectal aspect. **D.** Dorsal aspect. Annotations: **da,** dorsal apophysis; **ef,** ental fold; **el,** ental lobe; **fl,** flagellum; **Lam,** lamina; **med,** median lobe; **Ped,** pedicel; **ssp,** sheath-shaped portion; **Tr,** trunk; **tro,** trough; **vc,** ventral concavity. Scale bar = 1 mm.

TYPE SPECIES: *Chactopsis insignis* Kraepelin, 1912.

DIAGNOSIS: *Chactopsis* is most closely related to *Chactopsoides*, n. gen., from which it may be separated as follows. Pedipalp chelal trichobothrium *ist* is absent and *isb* present, *it* is situated between *est* and *em*, Et_1 and Et_2 are situated in the same axis, and dm_1

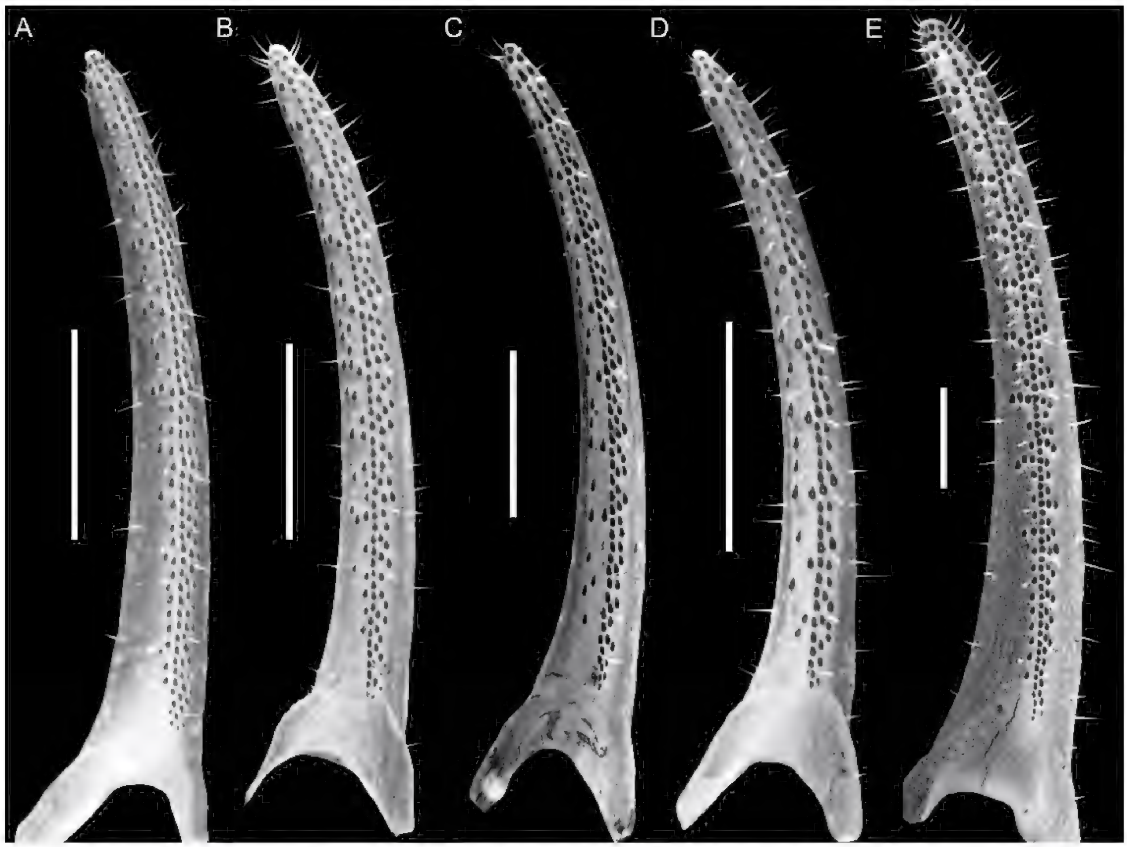

Fig. 9. *Chactopsis* Kraepelin, 1912, *Chactopsoides*, n. gen., and *Megachactops*, n. gen., dextral pedipalp chela, movable finger, dorsal aspect showing dentition. **A.** *Chactopsis curupira*, n. sp., paratype ♂ (MZSP). **B.** *Chactopsis insignis* Kraepelin, 1912, ♂ (MHNC). **C.** *Chactopsoides anduzei* (González-Sponga, 1982), n. comb., ♂ (AMNH). **D.** *Chactopsoides gonzalezspongai*, n. sp., paratype ♂ (AMNH). **E.** *Megachactops kuemoi*, n. sp., paratype ♀ (MHNC). Scale bars = 1 mm.

is situated proximal to or in the same axis as et_3 in *Chactopsis* (figs. 25, 28, 31, 34, 37, 40, 43); whereas *ist* is present and *isb* absent, *it* is situated between et_3 and *est*, Et_2 is situated distal to Et_1, and dm_1 is situated distal to et_3 in *Chactopsoides*, n. gen. (figs. 56, 60, 63). The hemispermatophore lamina is long and broad in *Chactopsis* (figs. 8, 26, 29, 38, 41, 44) but short and narrow in *Chactopsoides*, n. gen. (figs. 57, 61). The hemispermatophore flagellum is curved or straight, and the ental fold present and distinct along the ental margin, noticeably toward the dorsal surface, in *Chactopsis*, whereas the flagellum is slightly undulated (never curved) and the ental fold absent in *Chactopsoides*, n. gen. The hemispermatophore trunk is moderately or strongly tortuous medially, the sheath-shaped portion and the foot extend half or less than half the length of the trunk, the median longitudinal sulcus is absent, and the ventral concavity well developed in *Chactopsis* (fig. 8), whereas the trunk is elongated, the sheath-shaped portion extends more than two-thirds the length of the trunk, the foot extends almost the entire length of the trunk, the median longitudinal sulcus is present, and the ventral concavity reduced in *Chactopsoides*, n. gen. (fig. 57). The lobe region of the hemispermatophore is well developed, with two lobes; the ental lobe is slightly sclerotized, forming a projection toward the ental surface, and the median lobe is well developed in *Chactopsis*, whereas the lobe region is

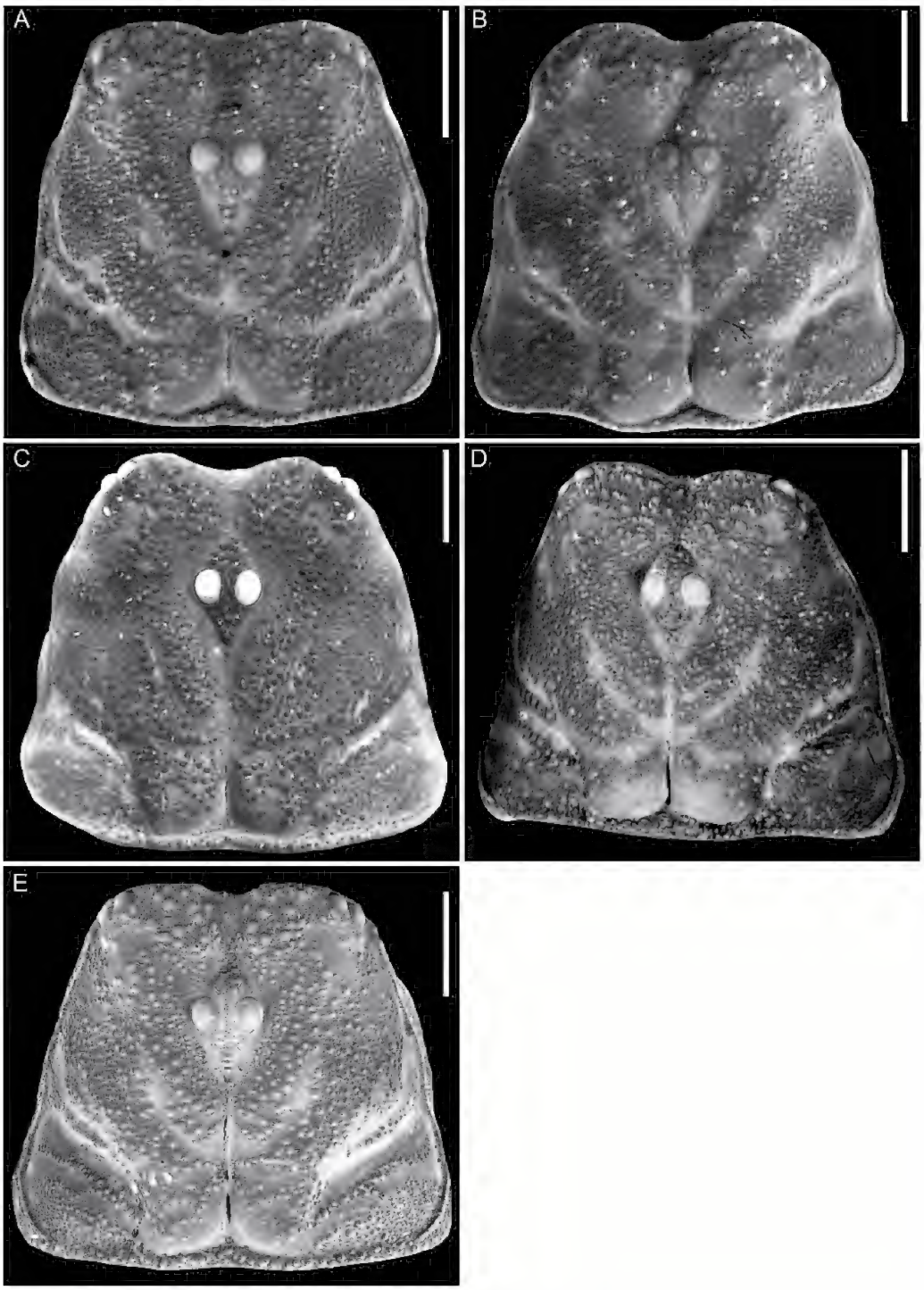

Fig. 10. *Chactopsis* Kraepelin, 1912, carapace, dorsal aspect. **A, B.** *Chactopsis amazonica* Lourenço and Francke, 1986. **A.** ♂ (MZSP). **B.** ♀ (MZSP). **C.** *Chactopsis barajuri* González-Sponga, 1982, holotype ♂ (MAGS). **D.** *Chactopsis chullachaqui*, n. sp., holotype ♂ (MHNC). **E.** *Chactopsis curupira*, n. sp., paratype ♂ (MZSP). Scale bars = 1 mm.

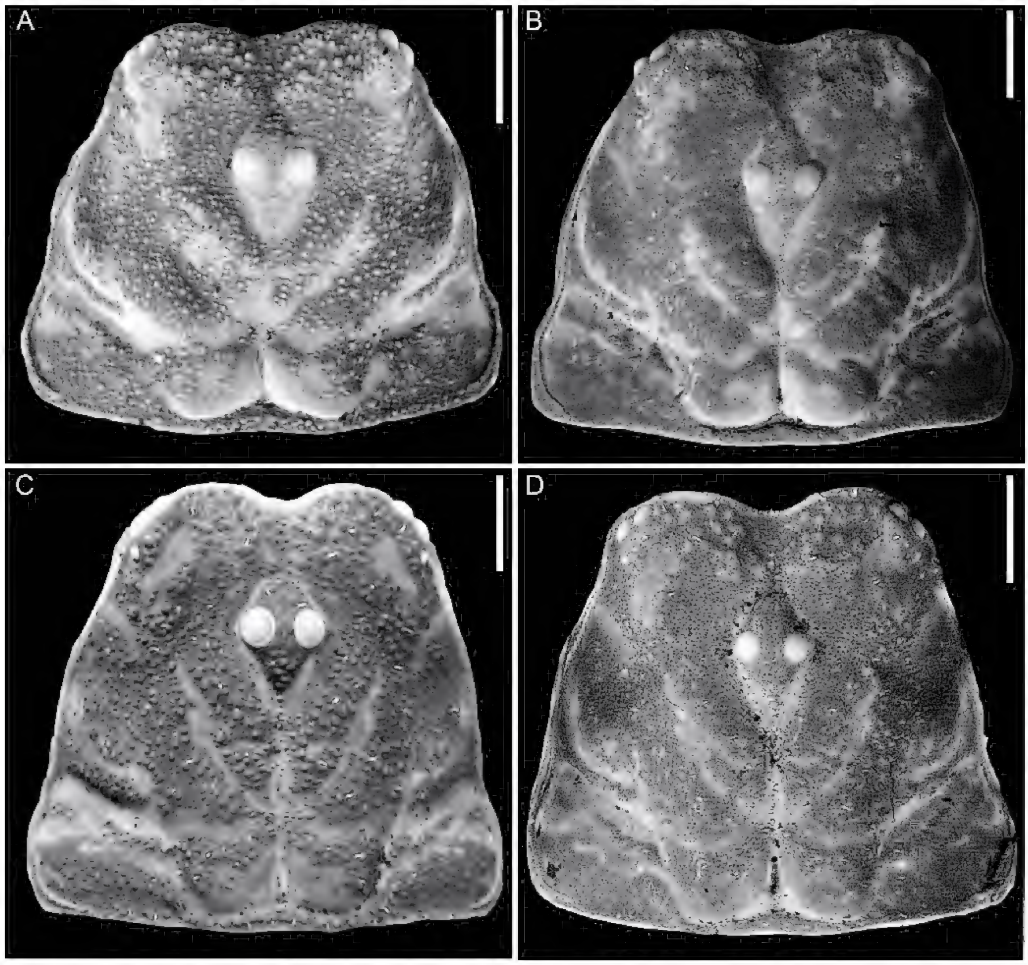

Fig. 11. *Chactopsis* Kraepelin, 1912, carapace, dorsal aspect. **A, B.** *Chactopsis insignis* Kraepelin, 1912. **A.** ♂ (MHNC). **B.** ♀ (MHNC). **C, D.** *Chactopsis siapaensis* González-Sponga, 1991. **C.** Holotype ♂ (MAGS). **D.** ♀ (AMNH). Scale bars = 1 mm.

reduced, the ental lobe absent, the median lobe relatively shorter and less developed in *Chactopsoides*, n. gen. Additionally, the lobe region possesses a sclerotized dorsal apophysis (figs. 8B, 26B), with a crest- or horn-shaped projection in *Chactopsis*, whereas the dorsal apophysis is well developed, but laminar and folded in *Chactopsoides*, n. sp. (fig. 57B). The hemispermatophores of *C. buhrnheimi* and *C. sujirima* are unknown, but these species are retained in *Chactopsis* based on their pedipalp trichobothrial pattern.

Chactopsis may be separated from *Megachactops*, n. gen., as follows. The carapace is acarinate and its anterior margin possesses a moderate to shallow median notch in *Chactopsis* (figs. 10, 11), whereas the carapace exhibits distinct median carinae, and its anterior margin possesses a conspicuous median notch, in *Megachactops*, n. gen. (fig. 64). The pedipalp patellar DM carinae are absent and the DPP present but weakly developed in *Chactopsis*, whereas the DM carinae are present and the DPP prominent in *Megachactops*, n. gen. (figs. 70B, 74B). Pedipalp patellar trichobothria v_6 and v_7 are situated submedially and out of alignment with v_1–v_5, which are situated close to the VE carina, in *Chactopsis* (fig. 24D), whereas v_6 and v_7 are aligned with v_1–v_5 and situated

Fig. 12. *Chactopsis* Kraepelin, 1912, tergites I–VII, dorsal aspect. **A.** *Chactopsis insignis* Kraepelin, 1912, ♂ (MHNC). **B.** *Chactopsis sujirima* González-Sponga, 1982, holotype ♀ (MAGS). Scale bars = 1 mm.

close to the VE carina in *Megachactops*, n. gen. (figs. 70D, 74D). Pedipalp chela trichobothrium *db* is situated in the proximal third of the fixed finger, and V_3 is situated medially on the manus, equidistant between V_1 and V_4, in *Chactopsis* (fig. 25), whereas *db* is situated medially on the fixed finger, and V_3 is situated in the distal third of the manus, closer to V_1 than to V_4 in *Megachactops*, n. gen. (fig. 71). The VSM carinae of metasomal segment IV are complete and the VM carina absent in *Chactopsis*, whereas the VSM carinae are incomplete and the VM carina present medially (well developed or vestigial) in *Megachactops*, n. gen. (fig. 68). The ML carinae of metasomal segment V occupy more than half the length of the segment in *Chactopsis* (figs. 15, 16, 17), but less than half its length in *Megachactops*, n. gen. (fig. 67). The hemispermatophore of the two genera differs as follows. The apex is elongated, the lobe region occupying one-fifth of the hemispermatophore length, the dorsal apophysis present, the ental lobe small, slightly sclerotized, and the median lobe usually papillose, in *Chactopsis* (figs. 8, 26, 29, 38, 41, 44), whereas the apex is short and subtriangular, the lobe region well developed, occupying a third of the hemispermatophore length, the dorsal apophysis absent, with two lobes, the ental lobe elongated, and the median lobe auriculate

and almost apapillose, in *Megachactops*, n. gen. (figs. 72, 76).

DESCRIPTION: The following general description outlines characters common to all species of *Chactopsis*.

Total length: Small scorpions, ranging in total length from 25–39 mm.

Coloration: Varies from yellowish to brownish with dark spots.

Chelicerae: Manus, dorsoexternal surfaces sparsely setose; ventral and internal surfaces densely setose. Fixed finger, dorsal margin with four teeth (distal, subdistal, median, and basal), median and basal teeth fused into a bicusp. Movable finger, dorsal margin with five teeth (distal, two subdistal, median, and basal); ventral margin usually with two teeth (distal, subdistal), except in *C. chullachaqui*, n. sp., in which ventral subdistal tooth is absent; dorsal distal tooth smaller than ventral distal tooth; ventral surface with long, well-developed serrula.

Carapace: Anterior margin with moderate to shallow median notch (figs. 10, 11). Posterior margin sublinear, usually with shallow median notch. Surfaces mostly granular, especially in ♂, more so on anterior third, ♀ less granular; nongranular surfaces punctate, with scattered microsetae; carinae absent or obsolete. Ocular tubercle well developed, slightly anteromedial; median ocelli well developed. Four pairs of lateral ocelli; anterolateral and median lateral pairs similar in size, approximately half the size of median ocelli; posterolateral pair smaller, approximately one-quarter the size of anterolateral and median lateral ocelli; dorsomedian pair greatly reduced, approximately one-quarter the size of posterolateral ocelli. Anteromedian longitudinal sulcus broad, well developed; postocular sulcus deep; posteromedian longitudinal and posterolateral sulci well developed; posterior transverse sulcus shallow.

Pedipalps: Patella, DM carina absent. Chela manus narrow and cylindrical, slightly more incrassate in ♀, with elongated fingers; nine carinae (D, SD, DS, DMA, DI, E, IM, VE, and VI) obsolete, usually identified by punctation, fine granulation, subtle differences in angles between adjacent surfaces, and/or pigmentation. Fixed-finger carinae moderately developed, costate; two porous areas usually present proximally, in place of DI carinae; dentition complex, median denticle row continuous, complete, flanked by 9–10 internal and external denticles in distal two-thirds, and numerous accessory denticles arranged in four to five rows, including at least one continuous row of external accessory denticles and at least one discontinuous row of internal accessory denticles.

Trichobothria: Femur with three trichobothria (figs. 24A, 27A, 30A, 33A, 36A, 39A, 42A): one external (*e*), one dorsal (*d*), one internal (*i*). Patella with 33 or 34 trichobothria (figs. 24B–D, 27B–D, 30B–D, 33B–D, 36B–D, 39B–D, 42B–D): two dorsal (d_1, d_2); seven ventral (v_1–v_7), v_1–v_5 situated close to VE carina, v_6 and v_7 situated submedially and out of alignment with v_1–v_5; 23 or 24 external trichobothria (et_1–et_5, est_1–est_5, em_1–em_4, esb_1–esb_4, eb_1–eb_6), but usually 23, except 24 in *C. barajuri*, with additional *em* (em_4); one internal (*i*). Chela with 26 trichobothria (figs. 25, 28, 31, 34, 37, 40, 43): 10 situated on manus, three ventral (V_1, V_3, V_4), seven external (Et_1–Et_3, *Est*, *Esb*, Eb_1, Eb_2); 16 situated on fixed finger, seven external (et_1–et_3, *est*, *em*, *esb*, *eb*), six dorsal (*dt*, *dst*, dm_1, dm_2, *dsb*, *db*), three internal (*it*, *isb*, *ib*).

Legs: Prolateral surfaces usually granular, retrolateral surfaces smooth. Tibial spurs absent. Pro- and retrolateral pedal spurs present. Basitarsi setose, each with dorsal and ventral rows of small brushlike spinules. Telotarsi setose, each with ventromedian row of elongated spinules, flanked by two paired rows of setae (pro- and retroventral and pro- and retrolateral); ungues well developed, curved, equal in length.

Sternum: Shape subpentagonal with two lateral lobes, and lateral margins converging anteriorly; posterior width greater than length; posterior depression deep (figs. 13, 14).

Pectines: Pectinal plate, anterior margin with conspicuous median notch, lateral margins subparallel (♀) or converging posteriorly (♂) (figs. 13, 14). Pectines each comprising four lamellae, proximal and marginal lamellae larger, subdistal and distal lamellae smaller; proximal lamella usually fused with subdistal lamella; fulcra absent. Tooth count, 7–12.

Sternites: Sternites III–VI each with pair of small, oval spiracles, situated mediolaterally;

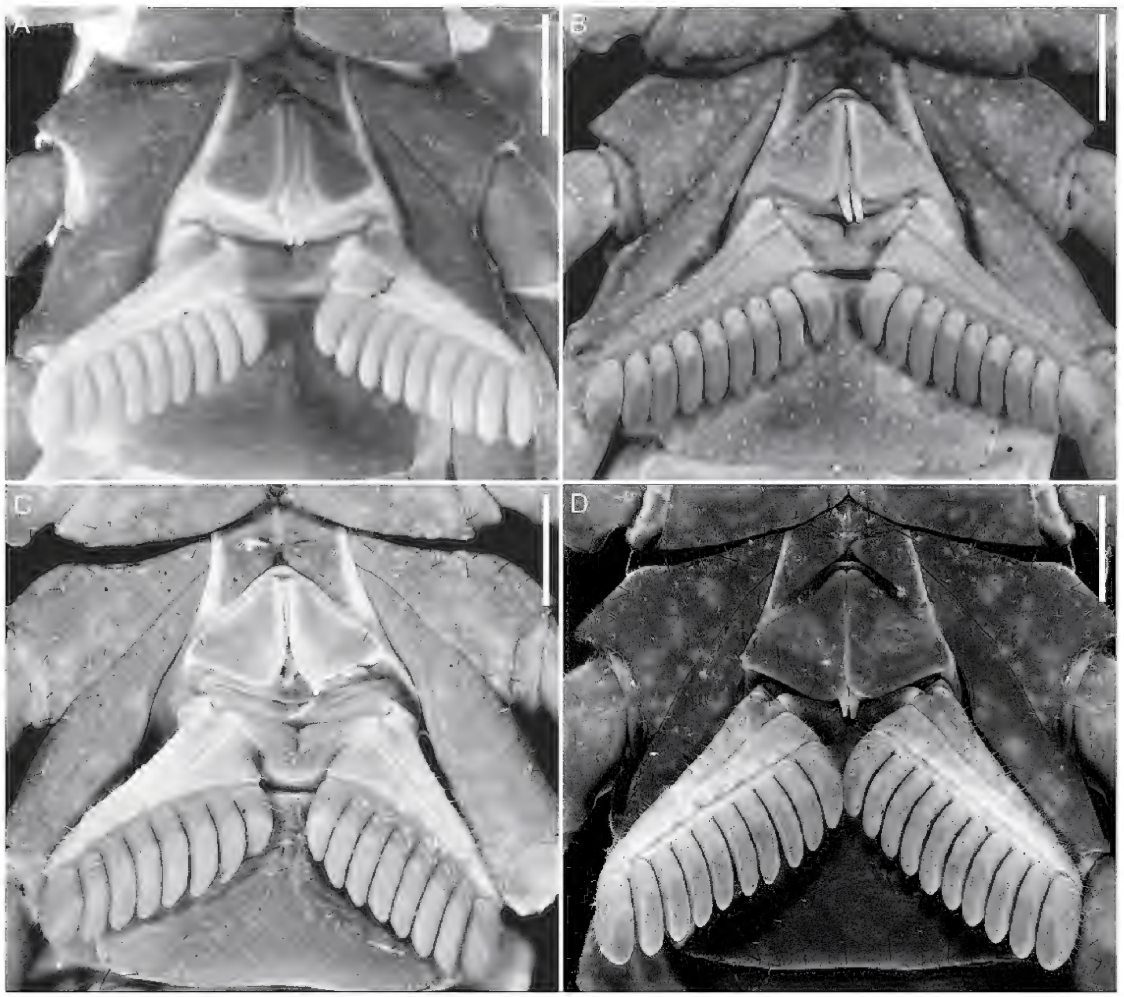

Fig. 13. *Chactopsis* Kraepelin, 1912, sternum and pectines, ventral aspect. **A.** *Chactopsis amazonica* Lourenço and Francke, 1986, ♂ (MZSP). **B.** *Chactopsis barajuri* González-Sponga, 1982, holotype ♂ (MAGS). **C.** *Chactopsis chullachaqui*, n. sp., holotype ♂ (MHNC). **D.** *Chactopsis curupira*, n. sp., paratype ♂ (MZSP). Scale bars = 1 mm.

surfaces usually smooth and punctate; VII with VL carinae obsolete.

Metasoma: Metasomal segments I–V, intercarinal surfaces densely granular, nongranular surface punctate; DL, ML, VL, VSM, and VM carinae distinct; LSM carinae often vestigial; DSM carinae usually present on segments I and II; DSM and DL carinae converging distally on segments I–III, subparallel on IV; DL and VL carinae complete on all segments; ML carinae complete on segments I–IV, variably developed on V; LIM carinae less developed, complete only on segment I; porous areas, usually forming raised mounds, present posteriorly in place of LIM carinae on segments II–IV; VSM carinae usually present on segments II–IV; VM carina variably developed on segment V (figs. 15–21).

Telson: Vesicle slightly elongated. Aculeus short, gently curved (figs. 22, 23).

Hemispermatophore: Lamina weakly sclerotized, especially distally (figs. 8, 26, 29, 38, 41, 44); apex elongated, broad proximally and medially, curved, and progressively tapering distally, and terminating in flagellum (fig. 26A–C); frontal and distal crests absent; flagellum short, straight; ental margin with

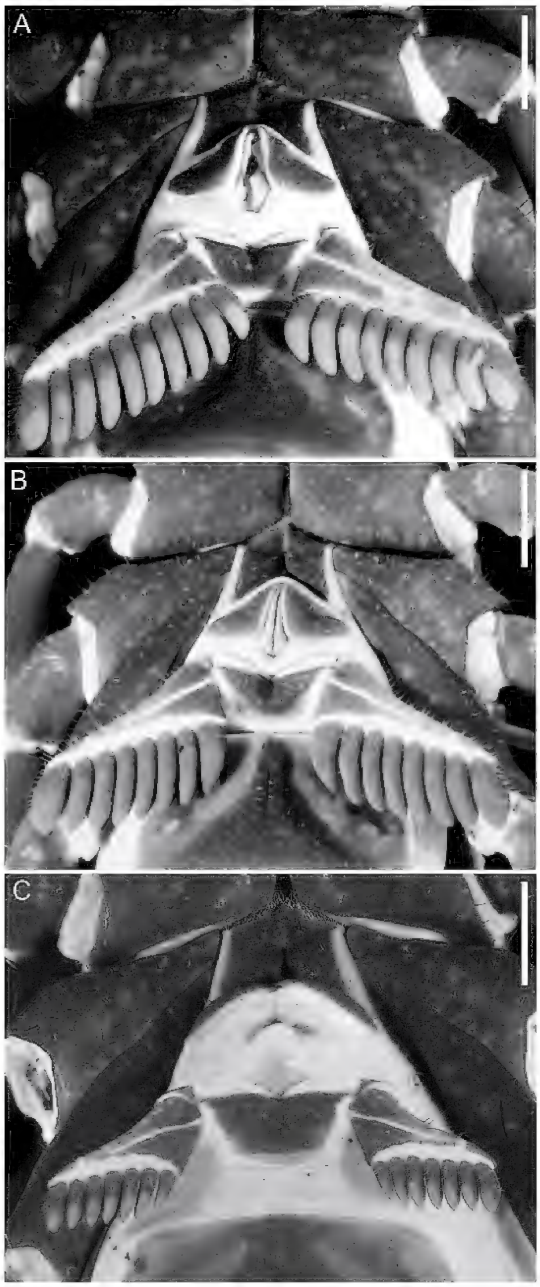

Fig. 14. *Chactopsis* Kraepelin, 1912, sternum and pectines, ventral aspect. **A.** *Chactopsis insignis* Kraepelin, 1912. ♂ (MHNC). **B, C.** *Chactopsis siapaensis* González-Sponga, 1991. **B.** Holotype ♂ (MAGS). **C.** ♀ (AMNH). Scale bars = 1 mm.

proximal fold; articular flexure present; pronounced proximal constriction forming short pedicel. Trunk well developed, tortuous medially; sheath shaped proximally, moderately developed; ventral surface concave distally, well developed; foot well developed, approximately half the length of trunk. Lobe region (capsule) complex, well developed with two lobes (ental and median lobes; fig. 8) and a sclerotized dorsal apophysis; median lobe usually papillose, forming internobasal reflexion of sperm duct, sometimes with conspicuous median trough; median trough well developed, usually deep.

INCLUDED TAXA: Eight species: *C. amazonica*; *C. barajuri*; *C. buhrnheimi*; *C. chullachaqui*, n. sp.; *C. curupira*, n. sp.; *C. insignis*; *C. siapaensis*; *C. sujirima*.

DISTRIBUTION: The genus *Chactopsis* is recorded from Brazil, Peru, and Venezuela (fig. 1).

HABITAT: The known species of *Chactopsis* inhabit tropical rainforest (fig. 3). Four species (*C. amazonica*, *C. buhrnheimi*, *C. curupira*, n. sp., and *C. insignis*) occur in the Amazon River basin of Brazil, *C. chullachaqui*, n. sp., occurs in piedmont rainforest on the eastern slopes of the Andes in Peru. Three species occur on the Guiana Shield: *C. barajuri* occurs in the state of Bolívar in Venezuela, *C. sujirima* occurs in the Orinoco River basin of Venezuela and Serra do Tapirapecó in Brazil; *C. siapaensis* occurs at the base of La Neblina mountain near the border between Brazil and Venezuela.

Chactopsis amazonica
Lourenço and Francke, 1986
Figures 1, 3A, 5A, B, 10A, B, 13A, 15A, 18A, 20A, 21A, 22A, B, 24, 25, 26

Chactopsis amazonicus Lourenço and Francke, 1986: 551, 552, figs. 2–9, 16–21, map 1; Lourenço, 1986a: 564, fig. 23, table II; 1986b: 165, fig. 5; 1988: 330, 331; 1991: 117; Höfer et al., 1996: 34, 36; Lourenço and Pinto-da-Rocha, 2000: 264.

Chactopsis amazonica: Sissom, 2000: 311; Soleglad and Sissom, 2001: 30, 92, figs. 134, 140, 168; Lourenço, 2002a: 216, 222, figs. 43, 499–516, 557; 2002b: 401, 429, 435, figs. 52, 71; Lourenço and Pézier, 2002: 178; Lourenço et al., 2005: 246; Pinto-da-Rocha et al., 2007: 146; Botero-Trujillo, 2008: 34; Flórez et al., 2008: 42; Saturnino et al., 2009: 64.

TYPE MATERIAL: **BRAZIL: Amazonas:** *Municipio Manaus*: Holotype ♂ (INPA-SP 38), Manaus, Reserva Ducke, km 26 on AM-010 [ca. 02°55′34″S 59°57′37″W, 110 m],

Fig. 15. *Chactopsis* Kraepelin, 1912, metasomal segments III–V, lateral aspect. **A.** *Chactopsis amazonica* Lourenço and Francke, 1986, ♂ (MZSP). **B.** *Chactopsis barajuri* González-Sponga, 1982, holotype ♂ (MAGS). **C.** *Chactopsis chullachaqui*, n. sp., holotype ♂ (MHNC). Scale bars = 1 mm.

25.vii.1978, N. Penny. Paratypes: same data as holotype, except 15.xi.1977, J. Arias, 1 juv. ♂ (INPA), 22.xi.1977, B.C. Ratcliffe; 1 ♀ (INPA), 29.xi.1977, J. Arias, 1 ♀ (INPA), 27.xii.1977, J. Arias, 1 ♂ (INPA), 17.i.1978, J. Arias, 1 ♂ (INPA), 17.i.1978, J. Arias, emergence trap 2–8, 1 ♂ (AMNH), 13.viii.1981, M.C. Coltro, 1 ♀ (MNHN), 23.i.1983, M.P.M. Aidar, allotype ♀ (INPA-SP 39); Manaus [ca. 03°07′S 60°01′W], 11.vi.1976, Máximos, 1 ♂ (AMNH); Tarumã Mirim (inundation forest), 17.i.1983, J. Adis, 1 juv. ♂ paratype (INPA-SP

40), 26.x.1982, J. Adis, 1 juv. ♀ paratype (INPA-SP 41).

NEW RECORDS: **BRAZIL: Amazonas:** *Municipio Iranduba*: AM 070, km 51 (terra firme), 03°10′56.9″S 60°26′47.2″W, 10.viii. 2007, V.T. Carvalho, 2 ♂ (INPA-SP 634). *Municipio Manaus*: Manaus, Reserva Ducke, 02°57′56.99″S 59°55′20.57″W, 28.ix–11.x. 2006, J.S. Araújo, 1 ♂ (INPA-SP 361), 02°55′34″S 59°57′37″W, 110 m, 16–17.xi. 2010, A. Pepato and J.A. Ochoa, 1 ♂, 1 ♀ (MHNC), 1 ♂ (MZSP).

DIAGNOSIS: *Chactopsis amazonica* appears to be most closely related to *C. barajuri* and *C. curupira*, n. sp., based on similarities in hemispermatophore morphology: flagellum straight; apex broad proximally, with ental fold situated subproximally; pedicel of lamina short, not reaching dorsal apophysis; lobe region with additional concave fold situated proximal to ental lobe; median lobe finely papillose on distal and ectal surfaces; dorsal apophysis forming crestlike projection (figs. 26, 29, 38). The hemispermatophores of *C. chullachaqui*, n. sp., *C. insignis*, and *C. siapaensis* differ from those of *C. amazonica*, *C. barajuri,* and *C. curupira*, n. sp., as follows: flagellum curved; apex with ental fold situated proximally; pedicel of lamina elongated; lobe region without additional concave fold; median lobe densely papillose across entire surface; dorsal apophysis forming horn-shaped projection (figs. 8, 41, 44).

Chactopsis amazonica, *C. barajuri,* and *C. curupira*, n. sp., may be separated from one another by means of the pedipalp trichobothrial pattern: *C. amazonica* and *C. curupira*, n. sp., possess three *em* trichobothria on the external surface of the patella (figs. 24C, 36C) whereas *C. barajuri* possesses four *em* trichobothria (fig. 27C); patellar trichobothrium est_2 is situated slightly proximal to or in the same axis as est_3 and est_4 in *C. amazonica*, but proximal to and distant from the other *est* trichobothria in *C. barajuri*; the angle formed by patellar trichobothria v_5–v_6–v_7 is greater than 90° in *C. amazonica* and *C. curupira*, n. sp., but approximately 90° in *C. barajuri*; chelal trichobothrium *Est* is situated closer to V_3 than to Et_1 in *C. amazonica* and *C. barajuri*, but equidistant between V_3 and Et_1 in *C. curupira*, n. sp. (fig. 37C). Additionally, the VM carina of metasomal segment V is obscured by granulation in the posterior quarter of the segment in *C. amazonica* (fig. 21A), whereas it is distinct and bifurcated posteriorly in *C. barajuri* and *C. curupira*, n. sp. (fig. 21B, D); the VSM carinae of metasomal segment I are absent and the telson entirely smooth in *C. amazonica*, whereas the VSM carinae are obsolete and the telson sparsely granular in *C. barajuri*. The ML carinae of metasomal segment V are restricted to the anterior two-thirds of the segment in *C. amazonica* and *C. curupira*, n. sp., but extend to almost 75% its length in *C. barajuri*. *Chactopsis amazonica* may be further separated from *C. barajuri* and *C. curupira*, n. sp., by means of the hemispermatophore morphology (figs. 26, 29, 38): a row of small spines along the distal margin of the median lobe, observed in *C. barajuri* and *C. curupira*, n. sp., is absent in *C. amazonica*; the dorsal apophysis is crest shaped, with the dorsal margin weakly serrated, in *C. barajuri*, smooth in *C. amazonica*, and bicuspid in *C. curupira*, n. sp.

SUPPLEMENTARY DESCRIPTION: The following supplements Lourenço and Francke's (1986) original description.

Trichobothria: Femur with three trichobothria (fig. 24A). Patella with 33 trichobothria (fig. 24B–D): two dorsal, seven ventral, 23 external, one internal; trichobothrium v_6 situated closer to v_5 than to v_7; est_5 situated on VE margin; est_2 situated slightly proximal to, or in same axis as est_3 and est_4; em_2 usually situated distal to em_1 and em_3; em_3 usually situated proximal to or in same axis as em_1; esb_2 situated distal to esb_3. Chela with 26 trichobothria (fig. 25): 10 situated on manus, three ventral, seven external; 16 situated on fixed finger, seven external, six dorsal, three internal (*it*, *isb*, *ib*); *ist* absent; *it* situated between *est* and *em*; *Est* situated closer to V_3 than to Et_1; Et_1 and Et_2 situated in same axis; *eb* situated proximal to base of fixed finger; *db* situated proximal to *esb*, usually closer to *esb* than to *eb* (equidistant between *esb* and *eb* observed in one case); dm_1 situated in same axis as et_3.

Hemispermatophore: Lamina elongated, slightly longer than trunk, ventral margin straight (fig. 26A–C); apex elongated, broad proximally and medially, curved and tapering distally; flagellum short, straight, less than

Fig. 16. *Chactopsis* Kraepelin, 1912, metasomal segments III–V, lateral aspect. **A.** *Chactopsis curupira*, n. sp., paratype ♂ (MZSP). **B.** *Chactopsis insignis* Kraepelin, 1912, ♂ (MHNC). Scale bars = 1 mm.

one-third the length of lamina; ental margin with proximal fold, approximately same length as flagellum, toward dorsal surface; articular flexure present; pedicel short. Trunk well developed, moderately tortuous medially; sheath-shaped part moderately developed, approximately half the length of trunk, with well-developed ventral concavity; foot half the length of trunk. Lobe region well developed with two lobes; ental lobe moderately developed, slightly sclerotized, forming a projection toward ental surface; median lobe well developed, extending ventrally, finely papillose entally and distally, distal

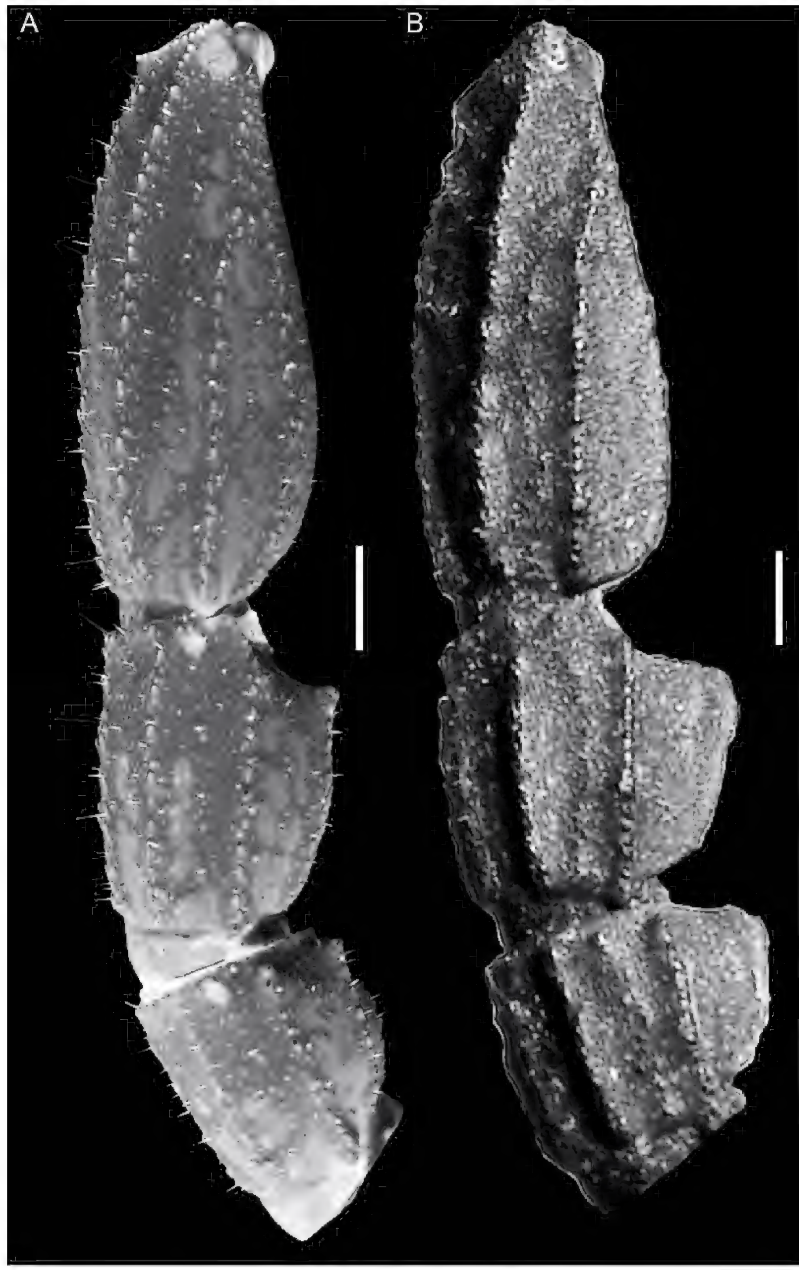

Fig. 17. *Chactopsis* Kraepelin, 1912, metasomal segments III–V, lateral aspect. **A.** *Chactopsis siapaensis* González-Sponga, 1991, holotype ♂ (MAGS). **B.** *Chactopsis sujirima* González-Sponga, 1982, holotype ♀ (MAGS). Scale bars = 1 mm.

margin without row of small spines; median trough well developed, deep; dorsal apophysis sclerotized, crest shaped, short, and curved distally; additional, well-developed concave fold proximal to lobe region (fig. 26A).

REMARKS: Five paratypes (2 ♂, 2 ♀, 1 juv. ♂), mentioned by Lourenço and Francke (1986) as originally deposited at INPA, were not found by Saturnino et al. (2009). In addition, the paratype ♂ from Manaus, collected on 11.vi.1976, was not found at the AMNH.

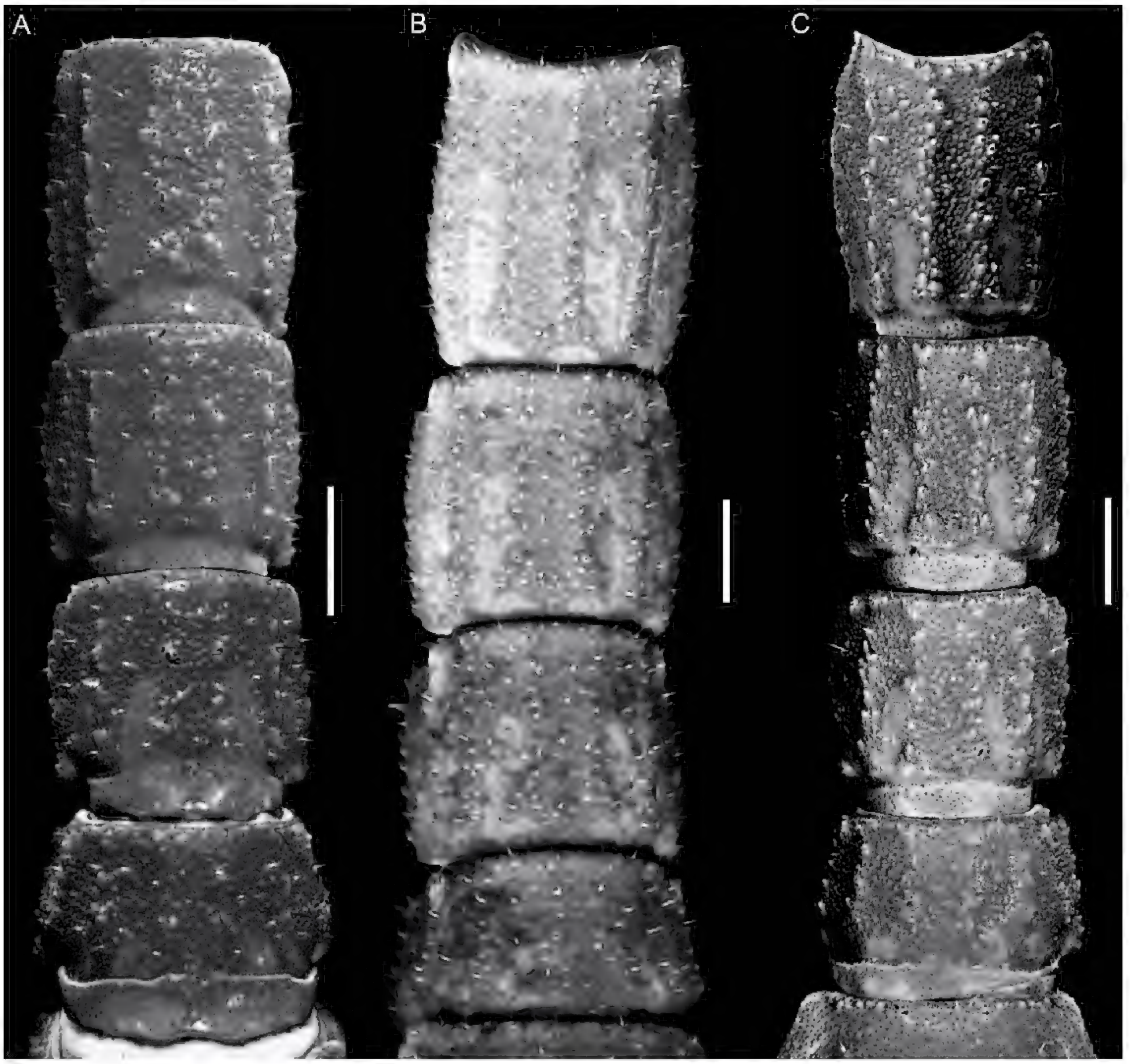

Fig. 18. *Chactopsis* Kraepelin, 1912, metasomal segments I–IV, ventral aspect. **A.** *Chactopsis amazonica* Lourenço and Francke, 1986, ♂ (MZSP). **B.** *Chactopsis barajuri* González-Sponga, 1982, holotype ♂ (MAGS). **C.** *Chactopsis chullachaqui*, n. sp., holotype ♂ (MHNC). Scale bars = 1 mm.

DISTRIBUTION: *Chactopsis amazonica* is known only from the vicinity of Manaus in the state of Amazonas, Brazil (fig. 1). Most of the known specimens were collected in Reserva Ducke (fig. 3A).

HABITAT: *Chactopsis amazonica* inhabits blackwater inundation forest (Tarumã Mirim) and "Terra Firme" forest (upland at Reserva Ducke, see fig. 3A). At Reserva Ducke, this species is syntopic with two other chactid scorpions, *Brotheas amazonicus* Lourenço, 1988 (the dominant ground-dwelling scorpion species), and *Broteochactas fei* Pinto-da-Rocha et al., 2002, and three buthids, *Ananteris dekeyseri* Lourenço, 1982, *Tityus metuendus* Pocock, 1897, and *Tityus silvestris* Pocock, 1897. At Tarumã Mirim, it is syntopic with *T. metuendus* and *T. silvestris*; three other buthids, *Tityus adisi* Lourenço, 2002, *Tityus canopensis* Lourenço and Pezier, 2002, and *Tityus lokiae* Lourenço, 2005, also occur in sympatry. Höfer et al. (1996) and Lourenço et al. (2005) provide more details concerning the localities and ecology of these scorpions.

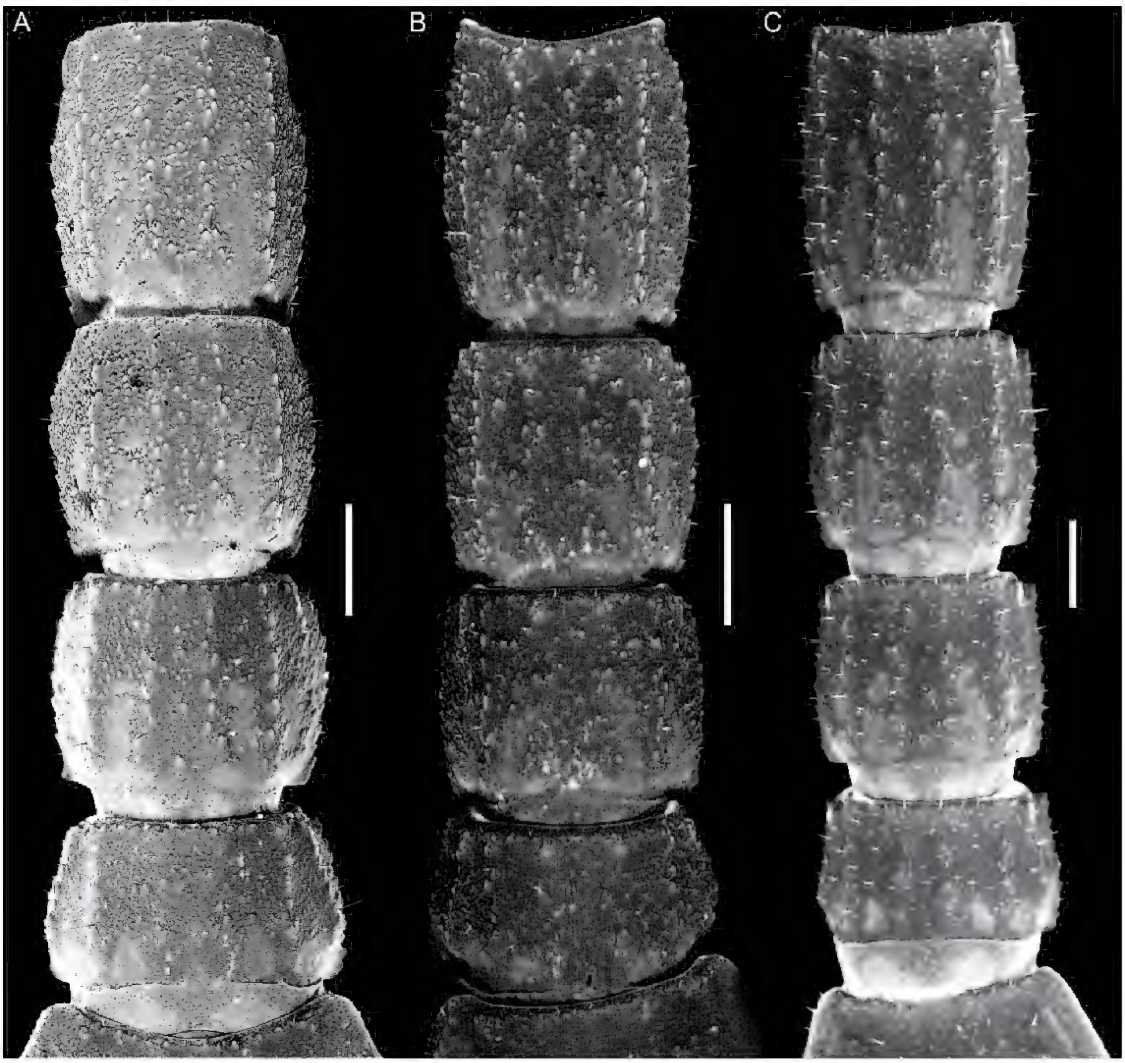

Fig. 19. *Chactopsis* Kraepelin, 1912, metasomal segments I–IV, ventral aspect. **A.** *Chactopsis curupira*, n. sp., paratype ♂ (MZSP). **B.** *Chactopsis insignis* Kraepelin, 1912, ♂ (MHNC). **C.** *Chactopsis siapaensis* González-Sponga, 1991, holotype ♂ (MAGS). Scale bars = 1 mm.

Chactopsis barajuri González-Sponga, 1982
Figures 1, 10C, 13B, 15B, 18B, 21B, 22C, 27, 28, 29

Chactopsis sp.: González-Sponga, 1978: 170–176, figs. 213–228; 1984a: 53 (part).

Chactopsis barajuri González-Sponga, 1982: 138–143, figs. 11–15; Lourenço, 1986a: 564, fig. 23, table II; 1986b: 165, fig. 5; Lourenço and Francke, 1986: 552; González-Sponga, 1991: 27, 32, 58, 59, map 1; Lourenço, 1991: 116; González-Sponga, 1996: 111, 114, figs. 252–255; Sissom, 2000: 311; Soleglad and Sissom, 2001: 92; González-Sponga, 2001: 29, 41, 49, map 5; Lourenço, 2002b: 435; Rojas-Runjaic and de Sousa, 2007: 299; Botero-Trujillo, 2008: 34.

TYPE MATERIAL: Holotype ♂ [not ♀] (MAGS 1804 ex MCNC 797), **VENEZUELA: Bolívar:** *Municipio Gran Sabana*: Santa Elena de Uairén, around airport [04°33′19.9″N 61°10′6.5″W], 900 m, 30.xi.1974, R. Delgado.

ADDITIONAL MATERIAL: **VENEZUELA: Bolívar:** *Municipio Gran Sabana*: Santa Elena de Uairén, around airport, 04°33′19.9″N 61°10′6.5″W, 925 m, 20.x.2008, S. Bazó, forest, 1 juv. (AMNH [LP 9236]).

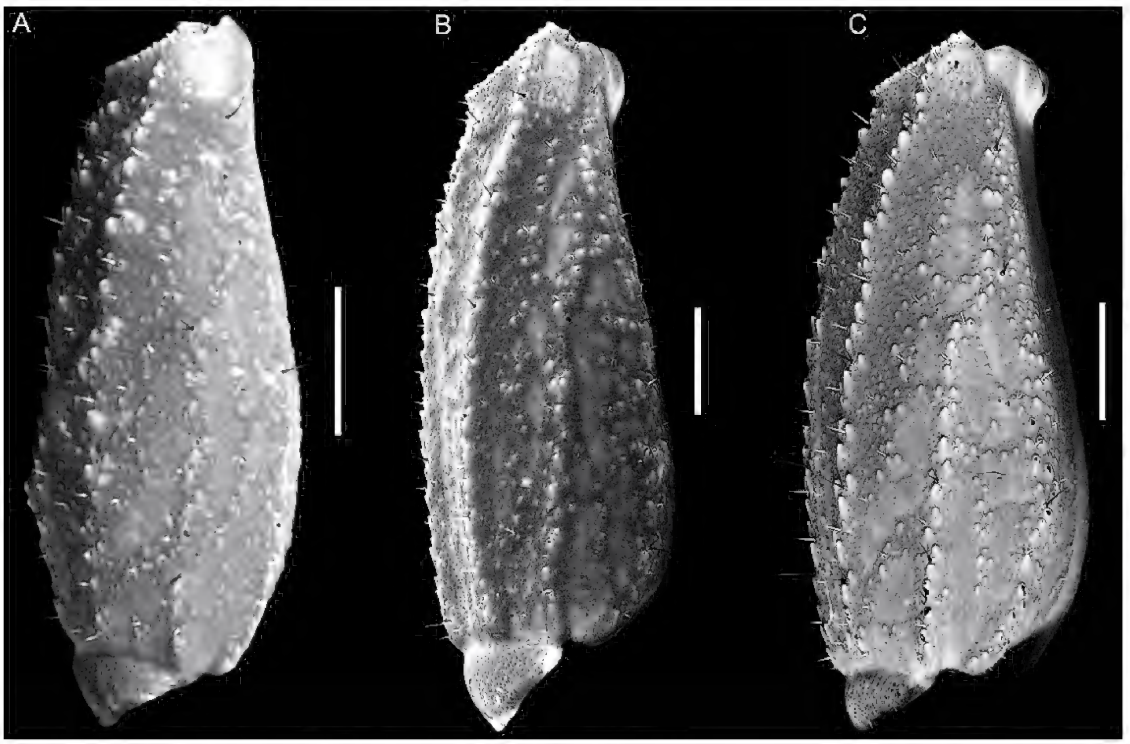

Fig. 20. *Chactopsis* Kraepelin, 1912, metasomal segment V, lateral aspect. **A.** *Chactopsis amazonica* Lourenço and Francke, 1986, ♀ (MZSP). **B.** *Chactopsis insignis* Kraepelin, 1912, ♀ (MHNC). **C.** *Chactopsis siapaensis* González-Sponga, 1991, ♀ (AMNH). Scale bars = 1 mm.

DIAGNOSIS: *Chactopsis barajuri* appears to be most closely related to *C. amazonica* and *C. curupira*, n. sp., based on similarities in hemispermatophore morphology: flagellum straight; apex broad proximally, with ental fold situated subproximally; pedicel of lamina short, not reaching dorsal apophysis; lobe region with additional concave fold situated proximal to ental lobe; median lobe finely papillose on distal and dorsal surfaces; dorsal apophysis forming crest-shaped projection. The hemispermatophores of *C. chullachaqui*, n. sp., *C. insignis*, and *C. siapaensis* differ from those of *C. barajuri*, *C. amazonica,* and *C. curupira*, n. sp., as follows: flagellum curved; apex with ental fold situated proximally; pedicel of lamina elongated; lobe region without additional concave fold; median lobe densely papillose across entire surface; dorsal apophysis forming horn-shaped projection (figs. 8, 26, 29, 38, 41, 44).

The hemispermatophore of *C. barajuri* differs from that of *C. amazonica* and *C. curupira*, n. sp., in several respects: the apex of the lamina is more elongated and the ental fold shorter in *C. barajuri* (fig. 29) than in *C. amazonica* and *C. curupira*, n. sp. (figs. 26, 38); the sheath-shaped portion occupies approximately one-third the length of the trunk in *C. barajuri*, compared with approximately half its length in *C. amazonica* and *C. curupira*, n. sp.; the median lobe possesses a row of small spines along the distal margin in *C. barajuri*, which is very conspicuous in *C. curupira*, n. sp., but absent in *C. amazonica*; the distal margin of the median lobe is not folded in *C. barajuri*, but is moderately folded toward the internal surface in *C. amazonica* and *C. curupira*, n. sp.; the dorsal apophysis is crest shaped in the three species, but with the dorsal margin weakly serrated in *C. barajuri* (fig. 29), smooth in *C. amazonica*, and bicuspid in *C. curupira*, n. sp. (figs. 26, 38). The most important diagnostic character of *C. barajuri* is the presence of an additional *em* trichobothrium on the pedipalp patella (24

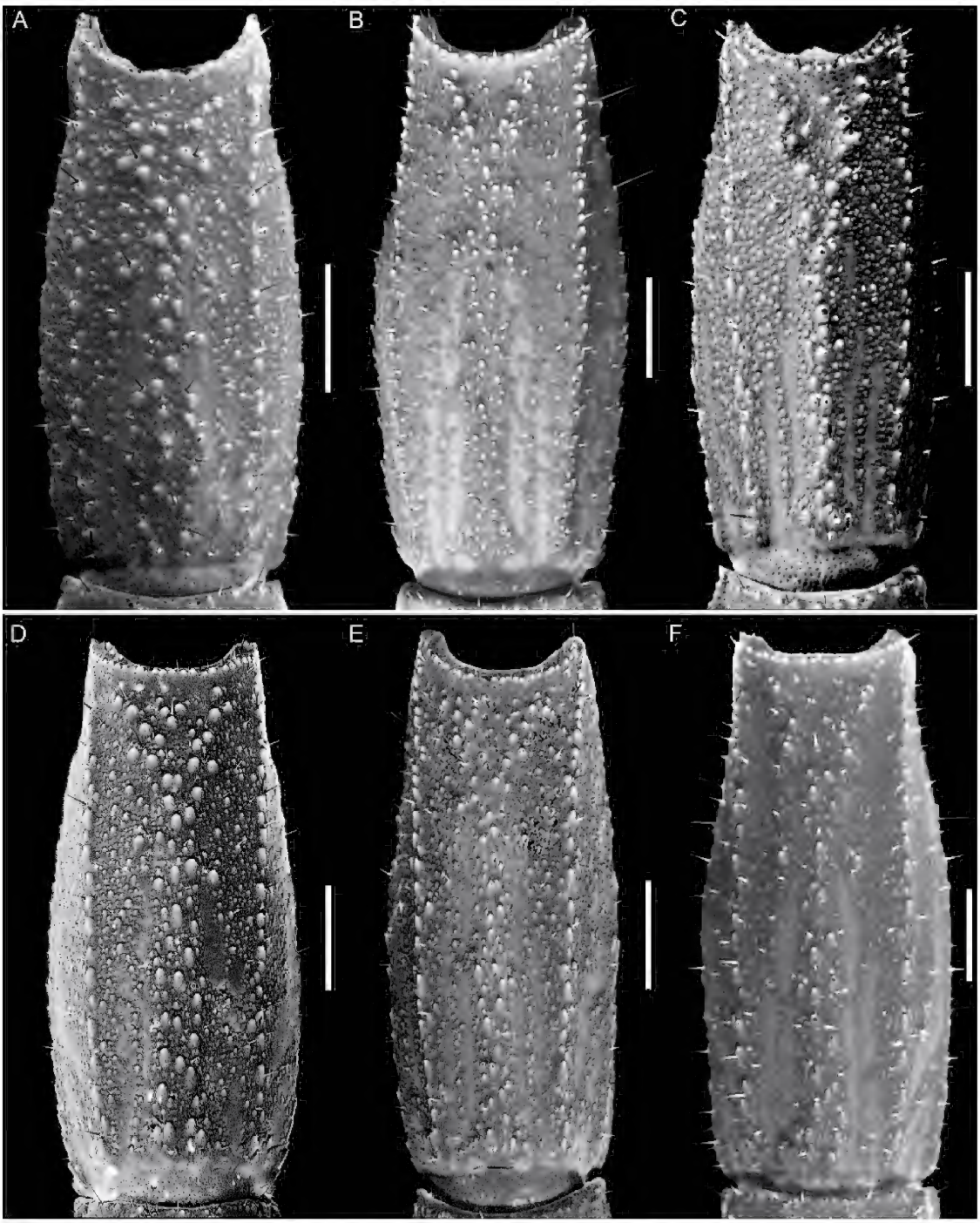

Fig. 21. *Chactopsis* Kraepelin, 1912, metasomal segment V, ventral aspect. **A.** *Chactopsis amazonica* Lourenço and Francke, 1986, ♀ (MZSP). **B.** *Chactopsis barajuri* González-Sponga, 1982, holotype ♂ (MAGS). **C.** *Chactopsis chullachaqui*, n. sp., holotype ♂ (MHNC). **D.** *Chactopsis curupira*, n. sp., paratype ♂ (MZSP). **E.** *Chactopsis insignis* Kraepelin, 1912, ♂ (MHNC). **F.** *Chactopsis siapaensis* González-Sponga, 1991, holotype ♂ (MAGS). Scale bars = 1 mm.

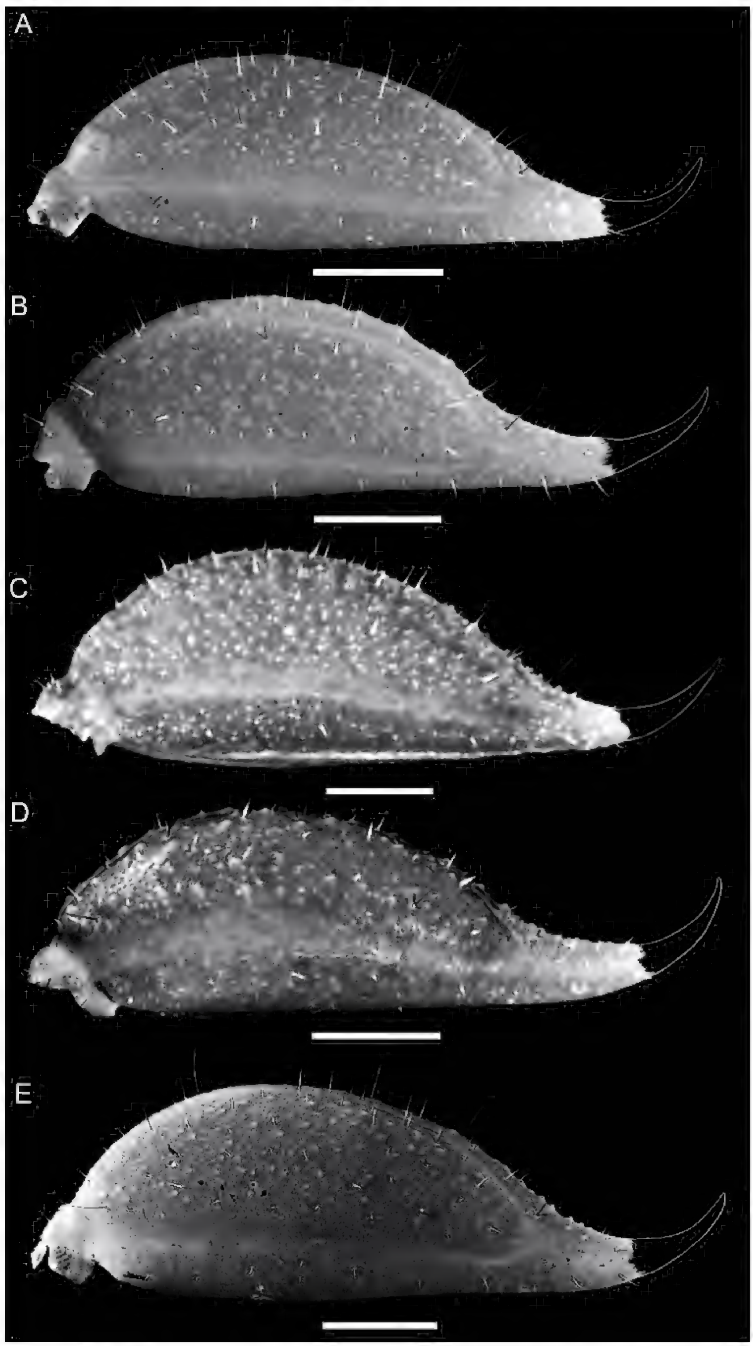

Fig. 22. *Chactopsis* Kraepelin, 1912, telson, lateral aspect. **A, B.** *Chactopsis amazonica* Lourenço and Francke, 1986. **A.** ♂ (MZSP). **B.** ♀ (MZSP). **C.** *Chactopsis barajuri* González-Sponga, 1982, holotype ♂ (MAGS). **D.** *Chactopsis chullachaqui*, n. sp., holotype ♂ (MHNC). **E.** *Chactopsis curupira*, n. sp., paratype ♂ (MZSP). Scale bars = 1 mm.

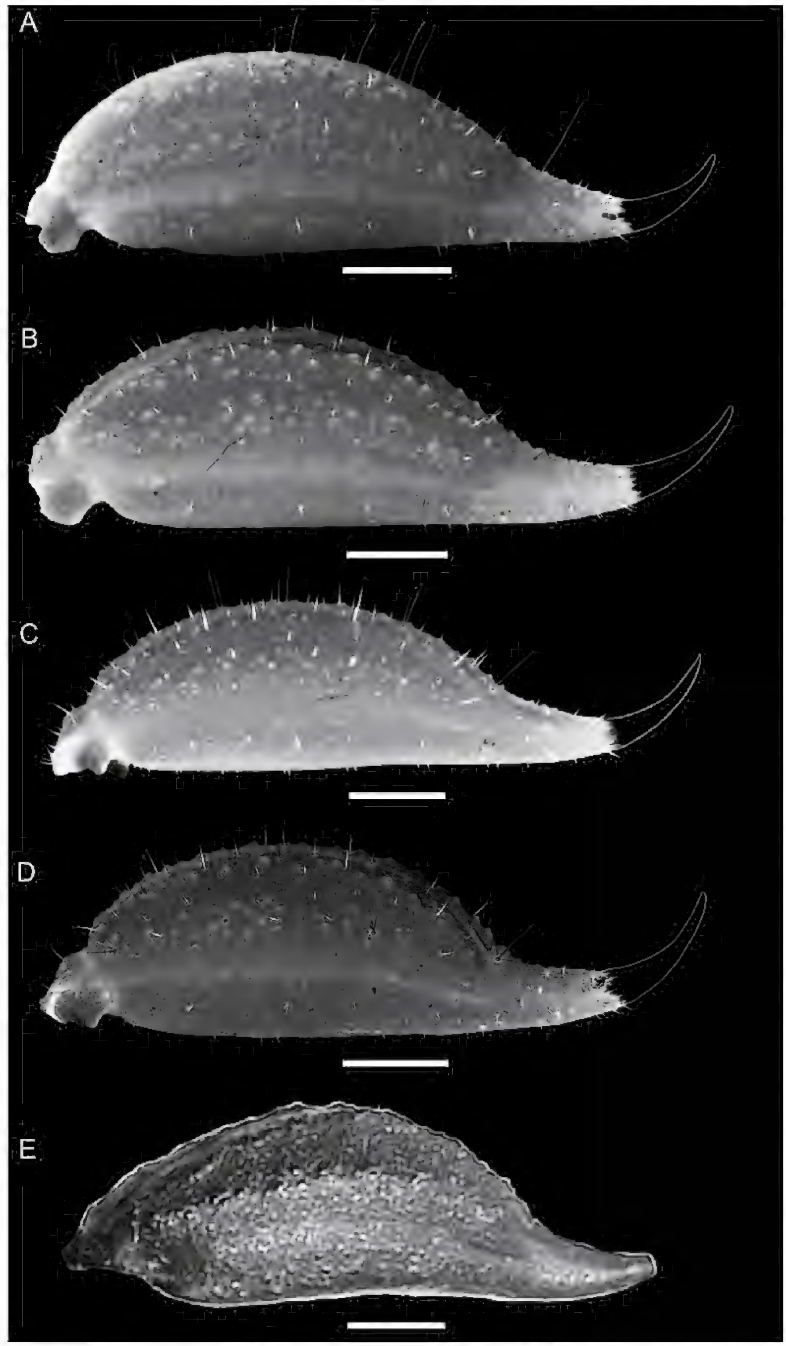

Fig. 23. *Chactopsis* Kraepelin, 1912, telson, lateral aspect. **A, B.** *Chactopsis insignis* Kraepelin, 1912. **A.** ♂ (MHNC). **B.** ♀ (MHNC). **C, D.** *Chactopsis siapaensis* González-Sponga, 1991. **C.** holotype ♂ (MAGS). **D.** ♀ (AMNH). **E.** *Chactopsis sujirima* González-Sponga, 1982, holotype ♀ (MAGS). Scale bars = 1 mm.

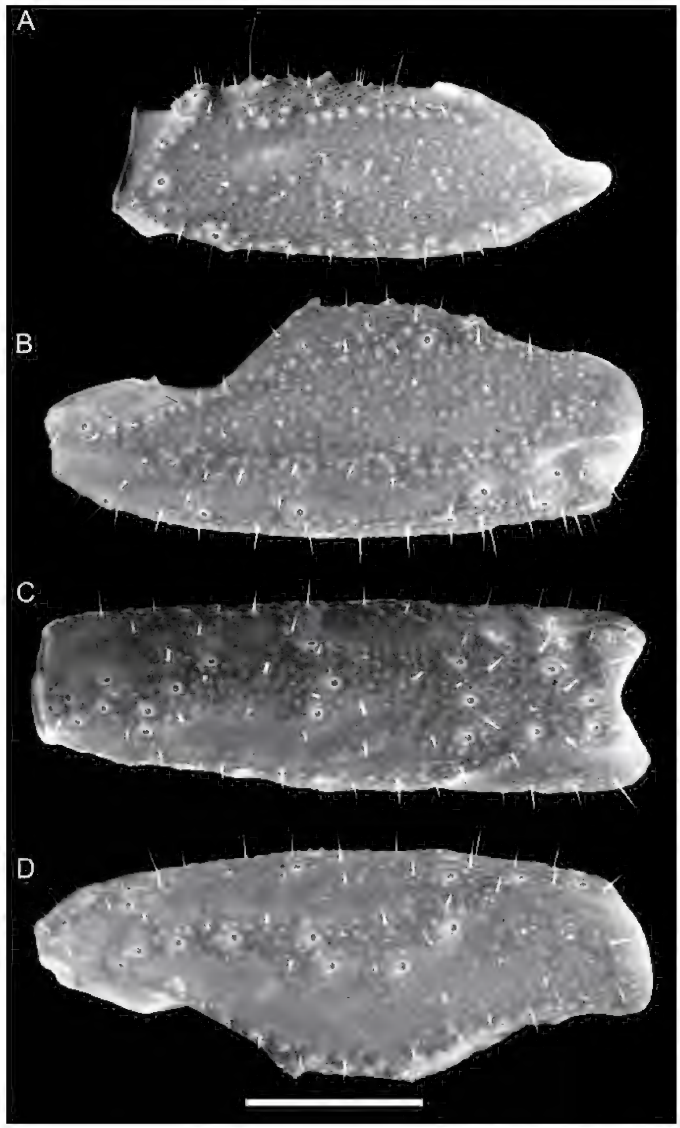

Fig. 24. *Chactopsis amazonica* Lourenço and Francke, 1986, ♂ (MZSP), dextral pedipalp segments. **A.** Femur. **B–D.** Patella. **A, B.** Dorsal aspect. **C.** External aspect. **D.** Ventral aspect. Scale bar = 1 mm.

external trichobothria; fig. 27C), compared with all other species of the genus, which possess three *em* thrichobothria (23 external trichobothria). Other differences in trichobothrial pattern among *C. barajuri*, *C. amazonica,* and *C. curupira*, n. sp., are as follows: patellar trichobothrium est_2 is situated proximal to and distant from the other *est* trichobothria in *C. barajuri* (fig. 28), but slightly proximal to or in the same axis as est_3 and est_4, in *C. amazonica* and *C. curupira*, n. sp. (figs. 25, 37); the angle formed by patellar trichobothria v_5–v_6–v_7 is approximately 90° in *C. barajuri*, but greater than 90° in *C. amazonica* and *C. curupira*, n. sp.; chelal trichobothrium *Est* is situated closer to V_3 than to Et_1 in *C. barajuri* and *C. amazonica*, but equidistant between Et_1 and V_3 in *C. curupira*, n. sp. *Chactopsis barajuri* may be further distinguished from *C. amazonica* and *C. curupira*, n. sp., by the metasomal carination: the VM carina of metasomal

Fig. 25. *Chactopsis amazonica* Lourenço and Francke, 1986, dextral pedipalp chela. **A.** ♂ (MZSP). **B–E.** ♀ (MZSP). **A, C.** External aspect. **B.** Dorsal aspect. **D.** Ventral aspect. **E.** Internal aspect. Scale bars = 1 mm.

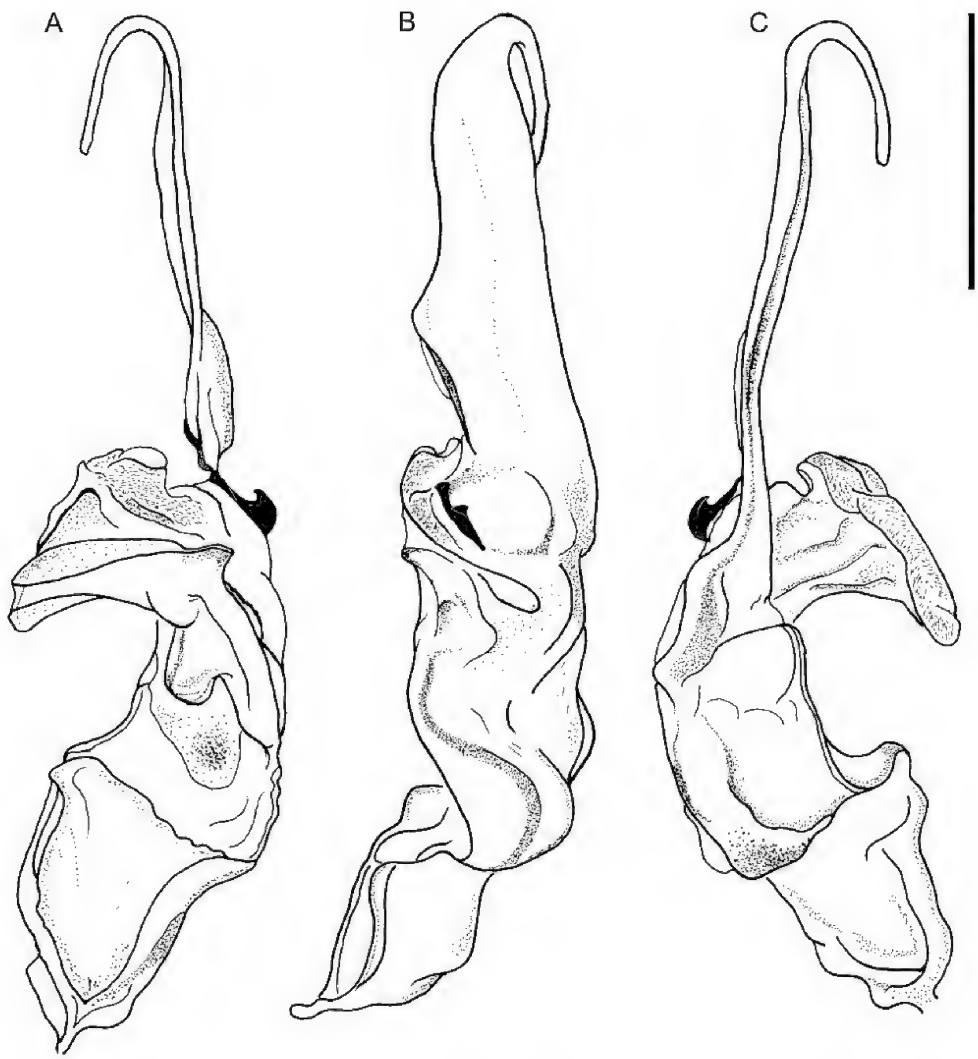

Fig. 26. *Chactopsis amazonica* Lourenço and Francke, 1986, ♂ (MZSP), sinistral hemispermatophore. **A.** Ental aspect. **B.** Dorsal aspect. **C.** Ectal aspect. Scale bar = 1 mm.

segment V is distinct and bifurcated posteriorly in *C. barajuri* and *C. curupira*, n. sp., whereas it is obscured by granulation in the posterior quarter of the segment in *C. amazonica* (fig. 21A, B, D); the VSM carinae of metasomal segment I are obsolete and the telson sparsely granular in *C. barajuri*, whereas the VSM carinae are absent and the telson entirely smooth in *C. amazonica*; the ML carinae of metasomal segment V extend almost 75% the length of the segment in *C. barajuri*, but are restricted to its anterior two-thirds in *C. amazonica* and *C. curupira*, n. sp.

SUPPLEMENTARY DESCRIPTION: The following supplements González-Sponga's (1982) original description.

Trichobothria: Femur with three trichobothria (fig. 27A). Patella with 34 trichobothria (fig. 27B–D): two dorsal, seven ventral, 24 external, one internal; additional *em* (em_4) trichobothrium situated proximal to other *em* trichobothria; trichobothrium v_6 situated closer to v_5 than to v_7; est_5 situated on VE margin; est_2 situated proximal to and distant from other *est* trichobothria; em_2 situated distal to em_1 and em_3; em_1 situated proximal to em_3; esb_2 situated distal to esb_3. Chela with

26 trichobothria (fig. 28): 10 situated on manus, three ventral, seven external; 16 situated on fixed finger, seven external, six dorsal, three internal (*it*, *isb*, *ib*); *ist* absent; *it* situated between *est* and *em*; *Est* situated closer to V_3 than to Et_1; Et_1 and Et_2 situated in same axis; *eb* situated proximal to base of fixed finger; *db* situated proximal to *esb*; dm_1 situated slightly proximal to et_3; *em* situated closer to *esb* than to *est*.

Hemispermatophore: Lamina elongated, longer than trunk, slightly tortuous medially (fig. 29A–C); apex elongated, broad proximally, curved, and progressively tapering distally; flagellum straight, approximately one-third length of lamina; ental margin with subproximal fold, shorter than flagellum, toward dorsal surface; articular flexure present; pedicel short, weakly developed. Trunk well developed, slightly tortuous medially; sheath-shaped part moderately developed, approximately one-third the length of trunk, with well-developed ventral concavity; foot unknown. Lobe region well developed with two lobes; ental lobe moderately developed, slightly sclerotized, forming projection toward ental surface; median lobe moderately developed, extending ventrally, mostly apapillose, except for fine papillae on distal and dorsal surfaces, distal margin not folded, with row of small spines; median trough well developed, deep; dorsal apophysis sclerotized, crest shaped, short, with dorsal margin weakly serrated; additional, well-developed concave fold proximal to lobe region.

REMARKS: The sex of the holotype (♂) was misidentified in the original description as ♀.

DISTRIBUTION: This species is known only from the type locality in the state of Bolívar, Venezuela (fig. 1).

HABITAT: The type locality of this species falls within an area of primary rainforest.

Chactopsis buhrnheimi Lourenço, 2003
Figures 1, 30, 31

Chactopsis buhrnheimi Lourenço, 2003: 169–173, figs. 4–14; Botero-Trujillo, 2008: 34.

TYPE MATERIAL: Subad. ♂ holotype (INPA-SP 042), **BRAZIL: Amazonas:** *Municipio Guajará*: Ipixuna river, 07°06′39″S 73°05′25″W, 13–19.vi.1995, P. Bührnheim and N.O. Aguiar.

DIAGNOSIS: This species appears to be most closely related to *C. insignis* based on the similar pedipalp carination and trichobothrial pattern. According to Lourenço (2003), *C. buhrnheimi* may be separated from *C. insignis* by its more pronounced granulation and by means of its pigmentation pattern, with carapace, tergites, sternites, coxosternal region, legs, and telson yellowish with black spots, and pedipalp femur blackish, patella and chela dark yellowish with some irregular spots.

SUPPLEMENTARY DESCRIPTION: The following supplements Lourenço's (2003) original description.

Trichobothria: Femur with three trichobothria (fig. 30A). Patella with 33 trichobothria (fig. 30B–D): two dorsal, seven ventral, 23 external, one internal; trichobothrium v_6 situated slightly closer to v_5 than v_7; est_5 situated on VE margin, slightly distal to est_4; est_2 situated proximal to est_3 and est_4; et_3 situated slightly distal to et_4; em_1 situated slightly proximal to em_2 and em_3; em_2 and em_3 situated in the same axis; esb_2 situated slightly distal to esb_3. Chela with 26 trichobothria (fig. 31): 10 situated on manus, three ventral, seven external; 16 situated on fixed finger, seven external, six dorsal, three internal (*it*, *isb*, *ib*); *ist* absent; *it* situated proximal to *est*; *Est* situated closer to V_3 than to Et_1; Et_1 and Et_2 situated in same axis; *eb* situated proximal to base of fixed finger; *db* situated slighty proximal to *esb*; dm_1 situated slightly proximal to et_3.

REMARKS: The diagnosis provided in the original description of this species is uninformative, and fails to provide comparable differences with *C. insignis* or other species of the genus. The holotype is a subadult male hence the putative diagnostic differences proposed to separate it from, e.g., the female holotype of *C. insignis*, may be conflated with ontogenetic and/or sexual differences. Subadults and juveniles of other species of *Chactopsis* and *Chactopsoides*, n. gen. (e.g., *C. anduzei*, n. comb., and *C. gonzalezspongai*, n. sp.), often differ from adult conspecifics in the pigmentation pattern of the pedipalp patella and chela. Males of all species in these genera are more granular than females. The trichobothrial pattern of *C. buhrnheimi* is similar to that of *C. insignis*, with which it

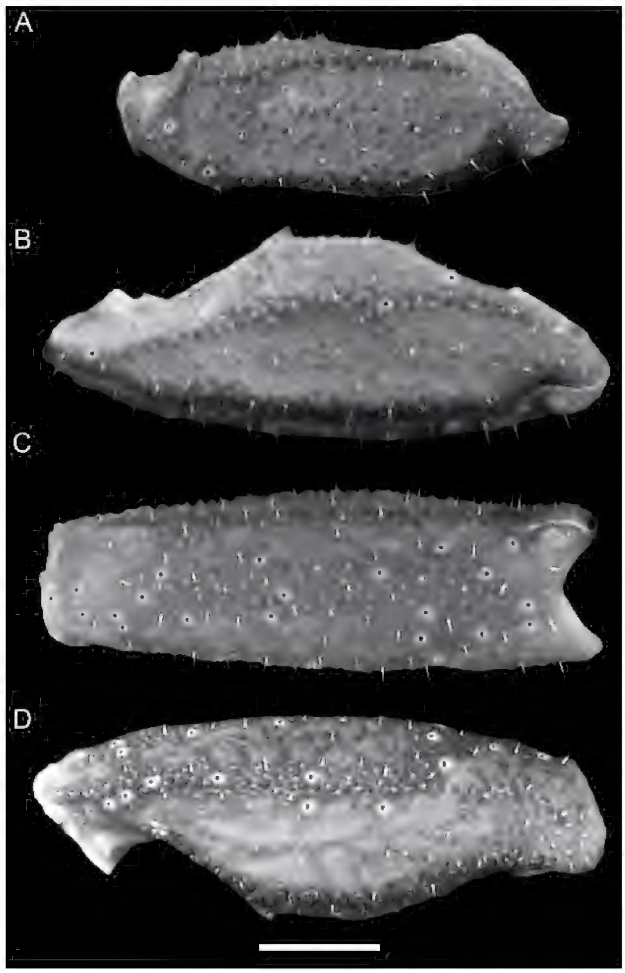

Fig. 27. *Chactopsis barajuri* González-Sponga, 1982, holotype ♂ (MAGS), dextral pedipalp segments. **A.** Femur. **B–D.** Patella. **A, B.** Dorsal aspect. **C.** External aspect. **D.** Ventral aspect. Scale bar = 1 mm.

may prove synonymous, once adult specimens become available.

DISTRIBUTION: This species is known only from the type locality in the state of Amazonas, Brazil, near the border with Peru (fig. 1).

HABITAT: The type locality falls within an area of primary rainforest. According to Lourenço (2003), the holotype was collected on a terrestrial bromeliad.

Chactopsis chullachaqui, n. sp.
Figures 1, 3B, 8, 10D, 13C, 15C, 18C, 21C, 22D, 32, 33, 34; table 5

TYPE MATERIAL: Holotype ♂ (MHNC), tissue (AMNH [LP 7773]), **PERU: San Martín Department:** *San Martín Province*: Catarata Guacamayo (near Tarapoto), San Antonio de Chumbaza, 06°23′13.8″S 76°24′06.0″W, 297 m, 8.xi.2007, J.A. Ochoa, J.C. Chaparro, and R. Gutiérrez, rainforest near stream, collected at night with UV light.

ETYMOLOGY: The specific name is a noun in apposition, taken from the Quechua words *chulla* and *chaqui*, meaning "unequal foot," and refers to a mythical spirit of the forest with unequal feet who guards the lands and the animals, from the folklore of Peruvian Amazonia.

DIAGNOSIS: *Chactopsis chullachaqui*, n. sp., appears to be most closely related to *C. insignis* and *C. siapaensis*, based on similarities in hemispermatophore morphology:

Fig. 28. *Chactopsis barajuri* González-Sponga, 1982, holotype ♂ (MAGS), dextral pedipalp chela. **A.** Dorsal aspect. **B.** External aspect. **C.** Ventral aspect. **D.** Internal aspect. Scale bar = 1 mm.

flagellum short and curved; apex with ental fold situated proximally on ental margin; lamina with basal constriction forming conspicuous, elongated pedicel; lobe region without additional concave fold; median lobe well developed, densely papillose across entire surface; dorsal apophysis sclerotized, forming horn-shaped projection, slightly curved apically (figs. 8, 41, 44). The hemispermatophores of *C. amazonica*, *C. barajuri*, and *C. curupira*, n. sp., differ from those of *C. chullachaqui*, n. sp., *C. insignis*, and *C. siapaensis* as follows: flagellum straight; apex with ental fold situated subproximally; pedicel of lamina short; lobe region with additional concave fold; median lobe mostly apapillose, except for fine papillae distally and dorsally; dorsal apophysis short, forming crest-shaped projection.

Chactopsis chullachaqui, n. sp., may be distinguished from *C. insignis* and *C. siapaensis* as follows: pedipalp chelal trichobothrium

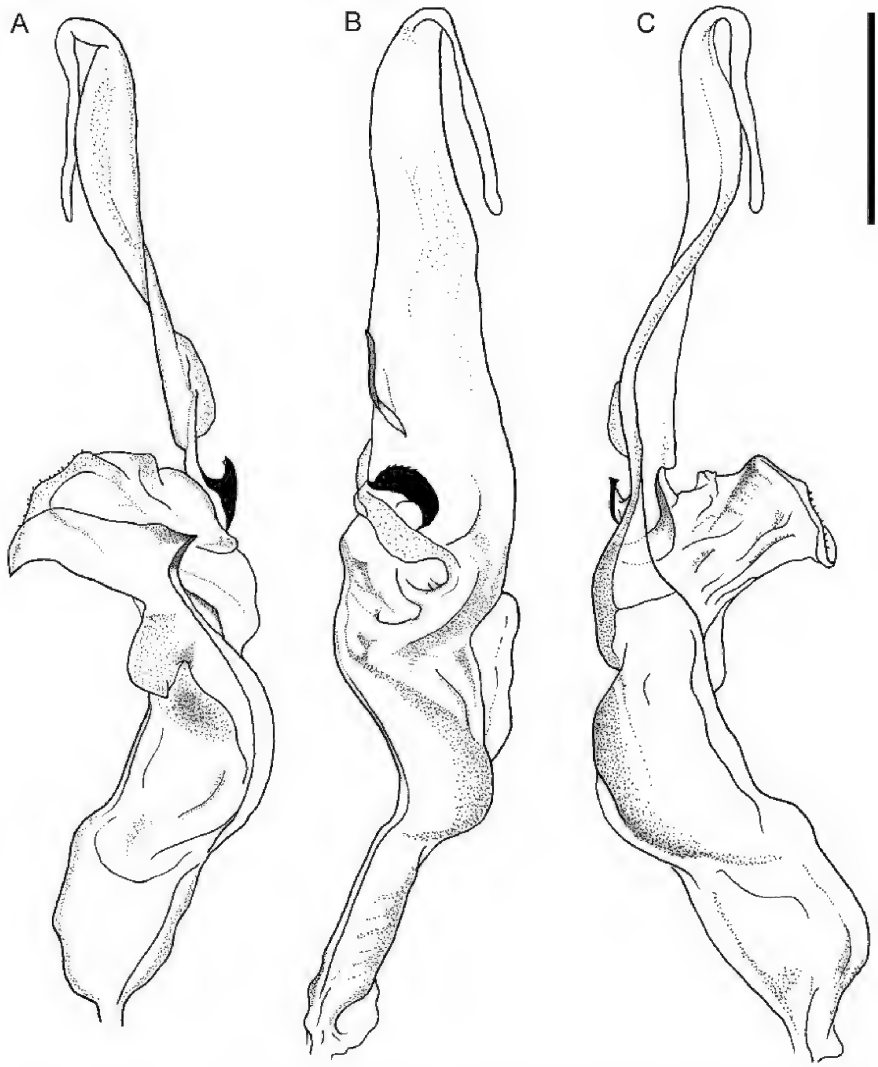

Fig. 29. *Chactopsis barajuri* González-Sponga, 1982, holotype ♂ (MAGS), sinistral hemispermatophore. **A.** Ental aspect. **B.** Dorsal aspect. **C.** Ectal aspect. Scale bar = 1 mm.

Est situated equidistant between V_3 and Et_1 in *C. chullachaqui*, n. sp., but closer to V_3 than to Et_1 in *C. insignis* and *C. siapaensis* (figs. 34, 40, 43); patellar trichobothrium esb_2 situated slightly proximal to esb_3 in *C. chullachaqui*, n. sp. (fig. 33), but distal to esb_3 in *C. insignis* and *C. siapaensis* (figs. 39, 42); pedipalp chela with two porous areas at base of fixed finger, between DMA and DI carinae, in *C. chullachaqui*, n. sp., and *C. siapaensis* (figs. 34, 43), but with three porous areas between DMA and DI carinae, and two additional porous areas in position of DI carinae, in *C. insignis* (fig. 40); pectinal tooth count (♂), 8/8 in *C. chullachaqui*, n. sp., and *C. siapaensis*, compared with 9–10/10 in *C. insignis*; telson (♂), lateral and ventral surfaces granular in *C. chullachaqui*, n. sp., and *C. siapaensis*, but lateral surfaces mostly smooth, ventral surfaces with few weak granules in *C. insignis*. The three species also differ in hemispermatophore morphology (figs. 8, 41, 44): the lamina is longer than the trunk, with a more slender apex in *C. chullachaqui*, n. sp., and *C. siapaensis*, but approximately as long as the trunk, with a broader apex in *C. insignis*; the dorsal apophysis is more pronounced in *C. chullachaqui*, n. sp., and *C. insignis* than in *C.*

siapaensis; the median trough is well developed and the median lobe densely papillose, except along the median trough, in *C. chullachaqui*, n. sp., and *C. insignis*, whereas the median trough is weakly developed and the median lobe entirely papillose on the ventral surface in *C. siapaensis*; the median lobe is moderately extended ventrally, with the distal margin markedly folded toward the ventral surface in *C. chullachaqui*, n. sp., but considerably extended ventrally, with the distal margin less folded to the ventral surface in *C. insignis* and *C. siapaensis*; the pedicel of the lamina is longer than the ental fold in *C. chullachaqui*, n. sp., and *C. insignis*, but approximately as long as the ental fold in *C. siapaensis*.

DESCRIPTION: Based on holotype ♂ (♀ unknown). Measurements of holotype recorded in table 5.

Total length: ♂, 27.55 mm.

Color: Base color chestnut with dark brown spots on chelicerae, carapace, tergites, sternite VII, metasoma, and pedipalps; sternites III–VI, coxosternal region, and legs chestnut yellow; pectines yellow; metasomal segment V and telson slightly darker than preceding segments, aculeus slightly darker than telson vesicle. Cheliceral manus, dorsal surfaces with fine reticulate pigmentation, becoming contiguous distally near base of fixed finger; movable finger entirely pigmented, fixed finger densely pigmented on proximal half. Carapace densely pigmented, especially on median ocular tubercle, interocular, circumocular, and anterolateral surfaces; anterior margin and anteromedian longitudinal sulcus densely pigmented; posteromedian longitudinal sulcus with spots of pigmentation; posterolateral surfaces with reticulate pigmentation; postocular sulcus unpigmented. Pedipalp femur, dorsal, external, and internal surfaces, and all carinae densely pigmented, ventral surfaces faintly pigmented, with small unpigmented areas; patella, dorsal and internal surfaces, and all carinae densely pigmented, external surface with pigmentation stripe along EM carina and additional reticulate pigmentation contiguous with dorsal and ventral pigmentation as well as with pigmentation stripes along VI and VE carinae; chela with dense pigmentation stripes along all carinae, contiguous distally at base of fixed finger; fixed and movable fingers pigmented on proximal half. Legs, femur, prolateral surface faintly pigmented throughout, retrolateral surface faintly pigmented on distal half only; patella and tibia, pro- and retrolateral surfaces pigmented. Tergites I–VII densely pigmented throughout, without unpigmented stripes. Sternites III–VI faintly pigmented throughout, slightly more so on VI; VII densely pigmented throughout, with two small unpigmented areas submedially in anterior third of segment. Metasomal segments I–IV densely pigmented, dorsal surfaces each with pigmentation stripes along DSM and DL carinae, surfaces between DSM carinae densely pigmented, contiguous with pigmentation along posterior margins of segment; lateral surfaces each with pigmentation stripes along LIM and ML carinae, and reticulate pigmentation along LSM carinae in posterior half of segment, surfaces between DL and ML carinae pigmented on posterior quarter of segment, surfaces between ML and LIM carinae densely pigmented on posterior two-thirds, surfaces between LIM and VL carinae pigmented on posterior half of segments I and II, and posterior third of III and IV; ventral surfaces each with three pigmentation stripes along VM and paired VL carinae, contiguous in posterior third of segment. Metasomal segment V, dorsal surface with paired, narrow DSM pigmentation stripes in anterior half of segment, becoming broader medially and contiguous in posterior third of segment, and contiguous with paired stripes of pigmentation along DL carinae in posterior half; lateral surface densely pigmented in posterior third of segment with reticulate pigmentation along LSM carinae and pigmentation stripes along ML carinae; ventral surface with three broad pigmentation stripes along VM and paired VL carinae, contiguous in posterior third of segment, and with fine reticulate pigmentation stripes along VSM carinae in anterior third, contiguous with dense pigmentation of surfaces between VL and VSM carinae in posterior two-thirds of segment. Telson vesicle, dorsal surface densely pigmented throughout; ventral surface with two broad VL and one narrow VM pigmentation stripes, separated by two narrow, unpigmented stripes.

Fig. 30. *Chactopsis buhrnheimi* Lourenço, 2003, juv. ♂ holotype (INPA), dextral pedipalp segments. **A.** Femur. **B–D.** Patella. **A, B.** Dorsal aspect. **C.** External aspect. **D.** Ventral aspect. Scale bar = 1 mm.

Chelicerae: Movable finger with well-developed serrula, occupying slightly less than half its length; ventral subdistal tooth absent.

Carapace: Anterior margin with moderate median notch and several microsetae (fig. 10D); posterior margin sublinear, without microsetae. Surfaces mostly granular, ocular tubercle slightly punctate; interocular surfaces coarsely granular; circumocular, anterolateral, median, lateral, and posterolateral surfaces with variable coarse and fine granulation; posteromedian surface smooth (fig. 10D). Median ocelli half an ocular diameter apart. Anteromedian longitudinal sulcus granular, nongranular surfaces punctate; other sulci smooth.

Pedipalps: Femur, length/width ratio, 3.18; DE, DI, and VI carinae complete, granular (fig. 33A); EM carina restricted to distal third of segment, weakly granular (♂); VM carina finely granular, restricted to proximal third of segment, obscured by fine granulation in distal two-thirds; VE carina absent; IM carina vestigial, reduced to three prominent, isolated granules in proximal half of segment; dorsal intercarinal surface with

Fig. 31. *Chactopsis buhrnheimi* Lourenço, 2003, juv. ♂ holotype (INPA), dextral pedipalp chela. **A.** Dorsal aspect. **B.** External aspect. **C.** Ventral aspect. **D.** Internal aspect. Scale bar = 1 mm.

variable fine and coarse granulation; external intercarinal surface almost smooth; ventral intercarinal surface finely granular, more so in proximal third of segment; internal intercarinal surface finely granular. Patella, length/width ratio, 2.70; DE, DI, and VI carinae complete, granular (fig. 33B–D); EM carina obsolete, reduced to punctation and weak granulation; VE carina restricted to proximal three-quarters of segment, slightly punctate in distal quarter; DPP and VPP each comprising moderate proximal granule and additional smaller granules, VPP less developed than DPP; dorsal intercarinal surface coarsely and densely granular; external and ventral intercarinal surfaces sparsely granular to almost smooth, and slightly punctate, more so distally; internal intercarinal surface densely granular. Chela manus narrow, fingers relatively elongated (fig. 34); chela length/width ratio, 5.07; length/height ratio, 5.42. Manus and fingers, intercarinal surfaces weakly

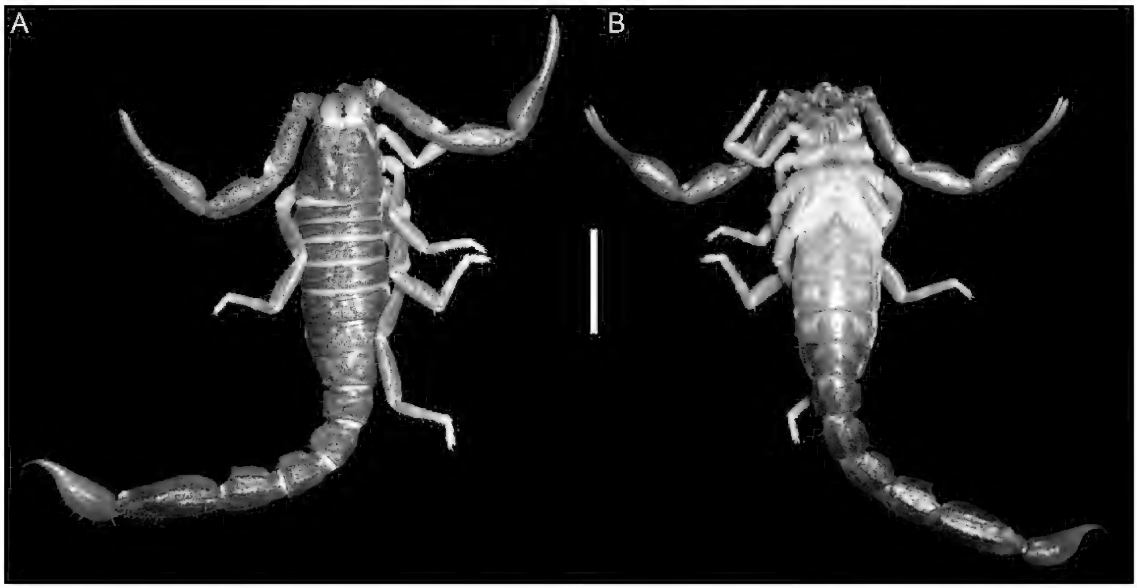

Fig. 32. *Chactopsis chullachaqui*, n. sp., holotype ♂ (MHNC), habitus. **A.** Dorsal aspect. **B.** Ventral aspect. Scale bar = 10 mm.

granular, nongranular surfaces densely punctate, and covered with scattered microsetae; D carina discontinuous, interrupted by *eb* tricrobothrium, weakly granular and punctate along entire length of manus, becoming costate on distal three-quarters of fixed finger; SD carina restricted to proximal third of manus, weakly granular and punctate; DS and DMA carinae complete, weakly granular and punctate on manus, becoming costate on fixed finger; DI carina discontinuous, interrupted by two porous areas at base of fixed finger, weakly granular and punctate on manus, becoming costate on distal three-quarters of fixed finger; E, VE, and VI carinae weakly granular and densely punctate in proximal half of manus; IM carina weakly granular and punctate. Fixed finger, median denticle row continuous, complete; flanked by 10 external and nine internal denticles; internal accessory denticles arranged in two rows; first row comprising few denticles, discontinuous in proximal half of finger, interspersed with internal denticles, second (internalmost) row comprising 14 denticles, discontinuous, restricted to distal two-thirds of finger; external accessory denticles arranged in two rows, one adjacent to median row, continuous in proximal 90% of finger, second (externalmost) row, discontinuous in distal half of finger, interspersed with external denticles.

Trichobothria: Femur with three trichobothria (fig. 33A). Patella with 33 trichobothria (fig. 33B–D): two dorsal, seven ventral, 23 external, one internal; trichobothrium v_6 situated closer to v_5 than to v_7; est_5 situated on VE margin and in same axis as est_4; est_2 situated slightly proximal to est_3 and est_4; em_1 situated slightly proximal to em_2 and em_3; esb_2 situated slightly proximal to esb_3. Chela with 26 trichobothria (fig. 34): 10 situated on manus, three ventral, seven external; 16 situated on fixed finger, seven external, six dorsal, three internal (*it*, *isb*, *ib*); *ist* absent; *it* situated in same axis as *est*; *Est* situated equidistant between V_3 and Et_1; Et_1 and Et_2 situated in same axis; *eb* situated near base of fixed finger; *db* situated in same axis as *esb*; dm_1 situated slightly proximal to et_3.

Legs: Prolateral surfaces granular, retrolateral surfaces smooth. Femur III, DI carina restricted to distal half of segment; DE carina absent; EM carina complete, but obscured by granulation; VI carina complete. Patella III, DI carina complete, becoming weaker in distal third of segment; VI carina restricted to three small granules distally; other carinae

absent or obsolete. Basitarsus III setose; retrodorsal row of small subspiniform granules restricted to proximal two-thirds of segment; prodorsal row absent; one dorsal and two ventral rows of small brushlike spinules, retrodorsal and proventral rows of spinules restricted to distal third of segment, ventral median row of spinules complete. Telotarsus III setose, pro- and retroventral rows each with 6–7 elongated macrosetae.

Tergites: Pretergites I–VII, surfaces punctate. Posttergites I–VI, surfaces finely and densely granular on I–III, finely granular in anterior half, and coarsely granular in posterior half of IV–VI (slightly more coarsely granular on VI); dorsomedian and dorsosubmedian carinae absent. Posttergite VII, surface finely granular laterally, becoming coarsely granular medially; paired dorsosubmedian and dorsolateral carinae moderately developed on posterior two-thirds; posterior margin with transverse row of small granules.

Sternum: Ventral surface with six macrosetae, one pair situated anteriorly and two pairs on posterolateral lobes; apex and anterior margins with several microsetae (fig. 13C).

Pectines: Pectinal tooth count: ♂, 8/8 (n = 2) (fig. 13C).

Sternites: Sternites III–VI, surfaces smooth, densely punctate; VII, surface smooth and punctate with sparse fine granules laterally, VL carinae vestigial, comprising one or two weak granules in medial third.

Metasoma: Segments I–IV, dorsal intercarinal surfaces finely granular, lateral and ventral intercarinal surfaces coarsely and densely granular (figs. 15C, 18C); small porous area situated posteriorly at LIM position on segments I–IV; DSM carinae comprising row of small granules, restricted to anterior two-thirds of segments I–III, vestigial on IV; DL carinae complete, granular, more pronounced posteriorly on segments III and IV; LSM carinae vestigial, reduced to few small granules posteriorly; ML carinae complete, granular on segments I–IV, posterior granules slightly larger than others, forming low mound on I–III; LIM carinae complete on segment I, reduced to posterior third of II, and to two or three posterior granules on III and IV; VL carinae complete, granular; VSM carinae complete on segments I–IV, becoming increasingly pronounced from anterior to posterior segments (fig. 15C). Segment V, length/width ratio, 2.00; length/height ratio, 2.26; dorsal intercarinal surface finely and sparsely granular; lateral and ventral intercarinal surfaces coarsely and densely granular (fig. 15C); porous area, situated posteriorly at LIM position, moderately developed; DL carinae complete, granular; LSM carinae absent; ML carinae restricted to anterior two-thirds of segment; LIM carinae absent; VL carinae complete, granular; VSM carinae vestigial, each comprising row of fine granules in anterior third of segment (fig. 21C); VM carina coarsely granular, restricted to anterior three-quarters of segment, bifurcating in posterior quarter.

Telson: Length/height ratio, 3.34. Vesicle slightly elongated; dorsal surface smooth; lateral and ventral surfaces granular (fig. 22D); ventral surface with few scattered microsetae. Aculeus short and gently curved.

Hemispermatophore: Lamina elongated, slightly longer than trunk (fig. 8A–D); apex broad proximally, curved, and progressively tapering distally; flagellum short and curved; ental margin with short proximal fold toward dorsal surface; articular flexure present; pedicel conspicuous, relatively elongated. Trunk well developed, very tortuous; sheath-shaped part approximately half length of trunk, with well-developed ventral concavity; foot unknown. Lobe region very complex with two lobes; ental lobe moderately developed, forming moderately sclerotized projection toward ental surface; median lobe well developed, extending ventrally, ventral surface densely papillose, except along median trough, more so distally, distal margin strongly folded, ventromedian trough deep, restricted to proximal two-thirds of median lobe; dorsal apophysis sclerotized, horn shaped, slightly curved distally, almost reaching ental fold of apex.

DISTRIBUTION: This species is known only from the type locality in the San Martín Department of northern Peru (fig. 1).

HABITAT: The type locality of this species is situated in piedmont rainforest on the eastern slopes of the Peruvian Andes (fig. 2B).

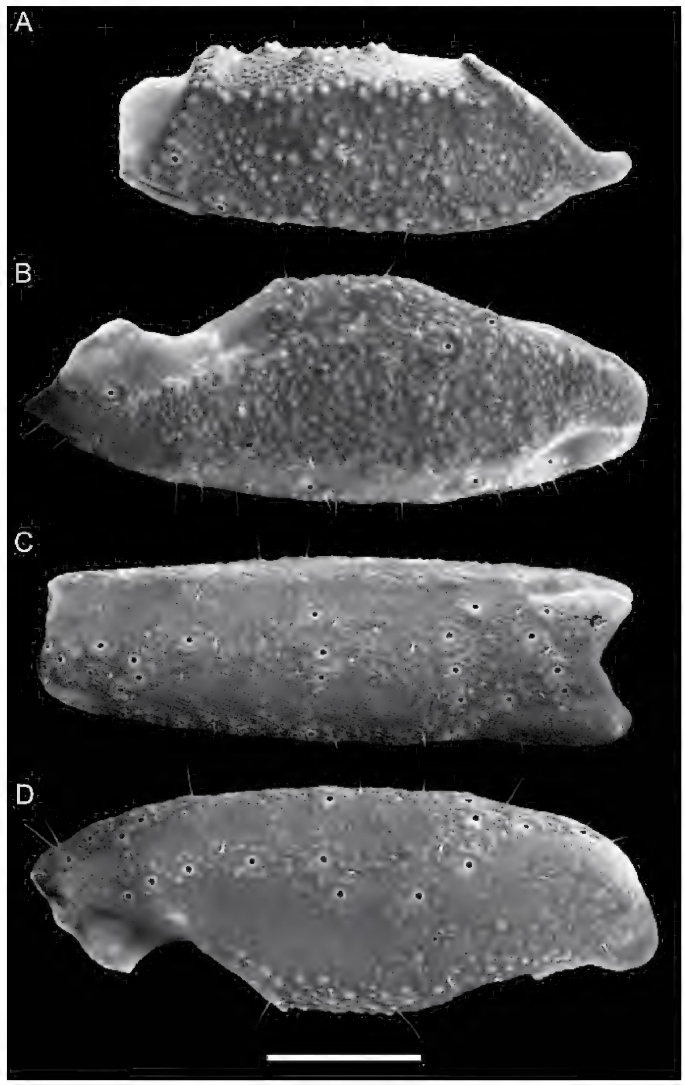

Fig. 33. *Chactopsis chullachaqui*, n. sp., holotype ♂ (MHNC), dextral pedipalp segments. **A.** Femur. **B–D.** Patella. **A, B.** Dorsal aspect. **C.** External aspect. **D.**Ventral aspect. Scale bar = 1 mm.

Chactopsis curupira, n. sp.
Figures 1, 9A, 10E, 13D, 16A, 19A, 21D, 22E, 35, 36, 37, 38; table 5

TYPE MATERIAL: Holotype ♂ (MZSP 41500), 5 ♂ paratypes (MZSP 21765), paratype ♂ (MHNC), **BRAZIL: Pará:** *Municipio Oriximiná*: Flona Saracá-Taquera, 01°30′S 56°30′W, 180 m, xi.2002, R. Moretti; 3 ♂ paratypes (MPEG 00415), Porto Trombetas, Plâto Almeidas [ca. 01°30′S 56°30′W, 180 m], 10–22.xii.2004.

ETYMOLOGY: The specific name is a noun in apposition, referring to a mythical inhabitant and protector of the forest, with long blond hair and feet directed backward, from the folklore of Brazilian Amazonia.

DIAGNOSIS: *Chactopsis curupira*, n. sp., appears to be most closely related to *C. amazonica* and *C. barajuri*, based on similarities in hemispermatophore morphology (figs. 26, 29, 38): flagellum straight; apex with ental fold situated subproximally; pedicel of

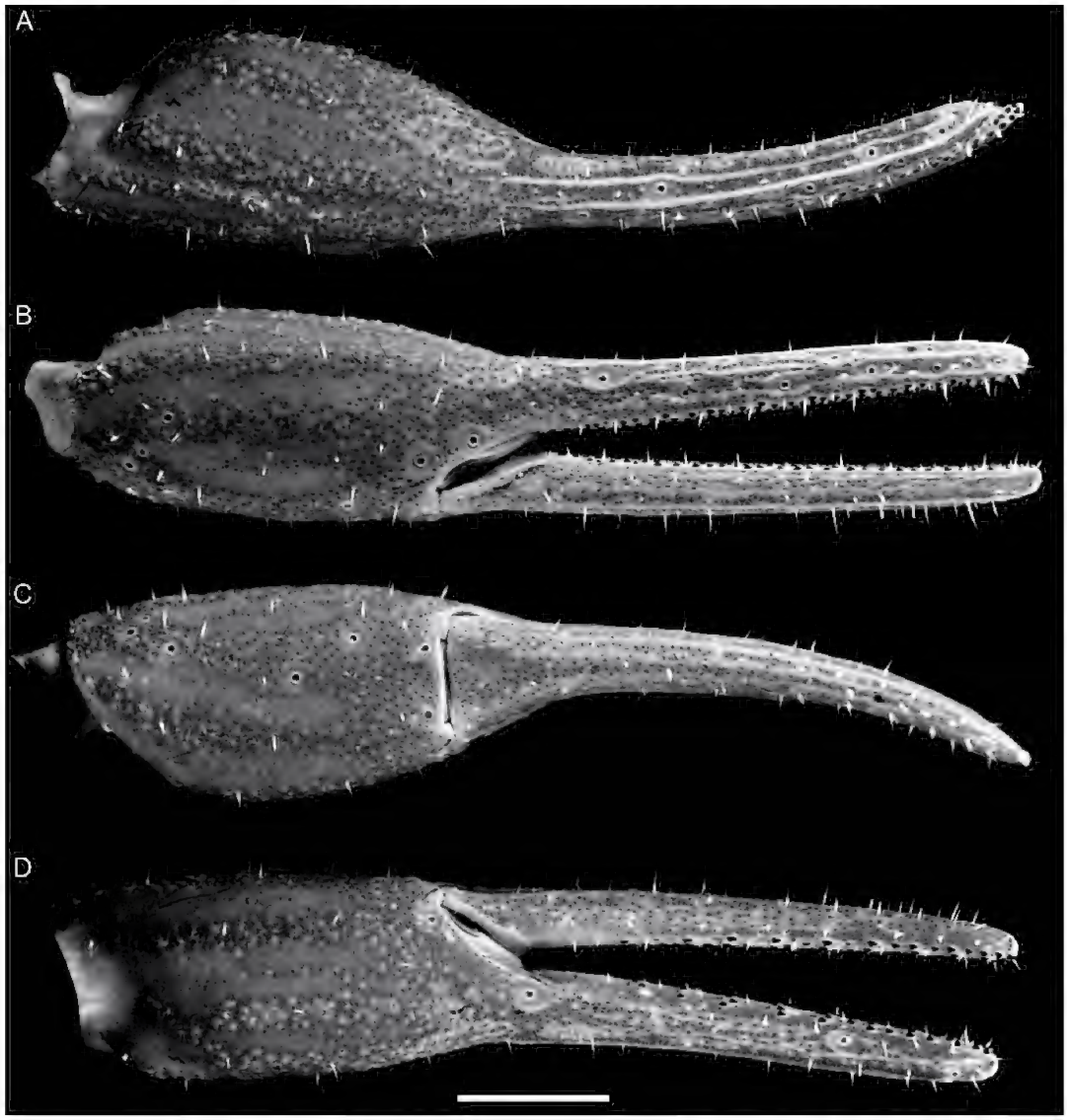

Fig. 34. *Chactopsis chullachaqui*, n. sp., holotype ♂ (MHNC), dextral pedipalp chela. **A.** Dorsal aspect. **B.** External aspect. **C.** Ventral aspect. **D.** Internal aspect. Scale bar = 1 mm.

lamina short, not reaching dorsal apophysis; lobe region with additional concave fold situated proximally to ental lobe; median lobe mostly apapillose, except for fine papillae distally and dorsally; dorsal apophysis forming crest-shaped projection. The hemispermatophores of *C. chullachaqui*, n. sp., *C. insignis*, and *C. siapaensis* (figs. 8, 41, 44) differ from those of *C. curupira*, n. sp., *C. amazonica*, and *C. barajuri* as follows (figs. 26, 29, 38): flagellum curved; ental fold situated proximally; pedicel of lamina elongated, reaching dorsal apophysis; lobe region without additional concave fold; median lobe densely papillose across entire surface; dorsal apophysis forming horn-shaped projection.

Chactopsis curupira, n. sp., *C. amazonica,* and *C. barajuri* may be separated from one another by means of the hemispermatophore morphology: the median lobe is in general more developed in *C. curupira*, n. sp., with an additional sublobe situated entally and a

TABLE 5

Measurements (mm) of *Chactopsis chullachaqui*, n. sp., *Chactopsis curupira*, n. sp., *Chactopsis insignis* Kraepelin, 1912, *Chactopsoides anduzei* (González-Sponga, 1982), n. comb., *Chactopsoides gonzalezspongai* n. sp., and *Megachactops kuemoi*, n. sp.

		C. chullachaqui	*C. curupira*	*C. insignis*		*C. anduzei*		*C. gonzalezspongai*		*M. kuemoi*	
	type	Holotype	Holotype					Holotype	Paratype	Holotype	Paratype
	sex	♂	♂	♂	♀	♂	♀	♂	♀	♂	♀
Specimen	collection	MHNC	MZSP	MHNC	MHNC	AMNH	AMNH	MHNLS	MHNC	MHNLS	AMNH
Carapace	length	3.7	3.75	3.85	4.75	4.13	4.69	4	4.56	7.3	9.8
	anterior width	2.5	2.55	2.7	3.45	2.63	3.13	2.46	3	6.67	6.8
	posterior width	4.35	4.05	4.4	5.5	4.25	5	4.25	5	8.25	10.8
Chela	length	7.6	6.38	7.2	9.2	6.31	7.25	5.78	6.75	13.5	18
	width	1.5	1.44	1.6	2.2	1.31	1.56	1.35	1.66	3.33	4.4
	height	1.4	1.41	1.45	2.1	1.31	1.63	1.35	1.69	3.17	4.6
	movable finger length	4.05	3.05	4.5	5.8	4.13	4.81	3.57	4.44	7.78	10.6
Patella	length	4.05	4.3	4.4	5.25	4.44	5	4.12	4.44	7.78	10.3
	width	1.5	1.6	1.6	2.1	1.5	1.81	1.42	1.81	3.17	4.3
Femur	length	3.5	3.6	3.55	4.2	3.69	4	3.32	3.69	6.98	9
	width	1.1	1.15	1.25	1.5	1.19	1.38	1.11	1.25	2.38	3
Mesosoma	length	6.3	6.2	6.05	7.9	6.13	7.19	8.43	6.88	17.3	17
Metasoma I	length	1.45	1.4	1.4	1.55	1.44	1.5	1.48	1.5	2.86	3.4
	width	2.6	2.55	2.55	3.05	2.63	3.06	2.71	3.13	4.44	5.3
Metasoma II	length	1.85	1.85	1.8	2.2	1.81	2	1.85	1.94	3.49	4.3
	width	2.3	2.3	2.25	2.8	2.44	2.75	2.52	2.88	3.81	4.6
Metasoma III	length	2.05	2.2	2.1	2.55	2	2.19	1.97	2.13	3.81	4.8
	width	2.25	2.75	2.2	2.7	2.38	2.69	2.52	2.81	3.61	4.4
Metasoma IV	length	2.45	2.7	2.5	2.85	2.31	2.63	2.52	2.69	4.29	5.3
	width	2.2	2.2	2.15	2.6	2.38	2.72	2.46	2.81	3.49	4.3
Metasoma V	length	4.4	4.95	4.9	5.4	5.12	5.38	4.74	4.88	8.25	9.6
	width	2.2	2.15	2.25	2.7	2.44	2.75	2.52	2.88	3.49	4.2
	height	1.95	2	2	2.35	2.06	2.19	2.28	2.44	3.17	3.6
Telson	total length	5.35	5.9	6.4	7.1	5.75	6.06	5.72	5.81	9.52	11.7
	vesicle length	3.75	4.2	4.7	4.9	3.94	4.09	3.94	3.75	6.83	9.2
	vesicle width	2.05	1.9	2	2.5	1.94	1.94	2.22	2.31	3.33	3.8
	vesicle height	1.65	1.75	1.9	2.1	1.69	1.69	1.97	1.87	3.02	3.6
	aculeus length	1.6	1.7	1.7	2.2	1.81	1.97	1.78	2.06	2.7	2.9
Metasoma+Telson	total length	17.55	19.05	19.1	21.65	18.43	19.76	18.3	18.95	32.2	39.1
Total length		27.55	29.0	29.0	34.3	28.69	31.64	30.7	30.39	56.8	65.9

Fig. 35. *Chactopsis curupira*, n. sp., paratype ♂ (MHNC), habitus. **A.** Dorsal aspect. **B.** Ventral aspect. Scale bar = 10 mm.

conspicuous row of spines along the distal margin, than in *C. amazonica* and *C. barajuri*, in which the additional sublobe is absent, and the row of spines is absent (*C. amazonica*) or obsolete (*C. barajuri*); the distal margin of the median lobe is moderately folded toward the ventral surface in *C. curupira*, n. sp., and *C. amazonica*, but not in *C. barajuri*; the apex of the lamina is broader in *C. curupira*, n. sp., than in *C. amazonica* and *C. barajuri*. The trichobothrial pattern provides further diagnostic characters for the three species (figs. 25, 28, 37): the patellar external surface possesses three *em* trichobothria in *C. curupira*, n. sp., and *C. amazonica*, but four in *C. barajuri*; patellar trichobothrium est_2 is situated slightly proximal to or in the same axis as est_3 and est_4 in *C. curupira*, n. sp., and *C. amazonica*, but proximal to and distant from the other *est* trichobothria in *C. barajuri*; the angle formed by patellar trichobothria v_5–v_6–v_7 is greater than 90° in *C. curupira*, n. sp., and *C. amazonica*, but approximately 90° in *C. barajuri*; chelal trichobothrium *Est* is situated equidistant between Et_1 and V_3 in *C. curupira*, n. sp., but closer to V_3 than to Et_1 in *C. amazonica* and *C. barajuri*. *Chactopsis curupira*, n. sp., may be further separated from *C. amazonica* as follows: the VM carina of metasomal segment V is restricted to the anterior three-quarters of the segment, and bifurcated posteriorly in *C. curupira*, n. sp., but obscured by granulation in the posterior quarter of the segment in *C. amazonica*; the VSM carinae of metasomal segment I are obsolete in *C. curupira*, n. sp., but absent in *C. amazonica*. *Chactopsis curupira*, n. sp., may be further separated from *C. barajuri* as follows: the dorsal apophysis of the hemispermatophore is bicuspid in *C. curupira*, n. sp., but weakly serrated dorsally in *C. barajuri*; the sheath-shaped portion occupies approximately half the length of the trunk in *C. curupira*, n. sp., but is restricted to its anterior third in *C. barajuri*.

DESCRIPTION: Based on the holotype and ♂ paratypes (♀ unknown). Measurements of holotype ♂ recorded in table 5.

Total length: ♂, 26.70–30.86 mm (n = 10; mean = 28.79 mm).

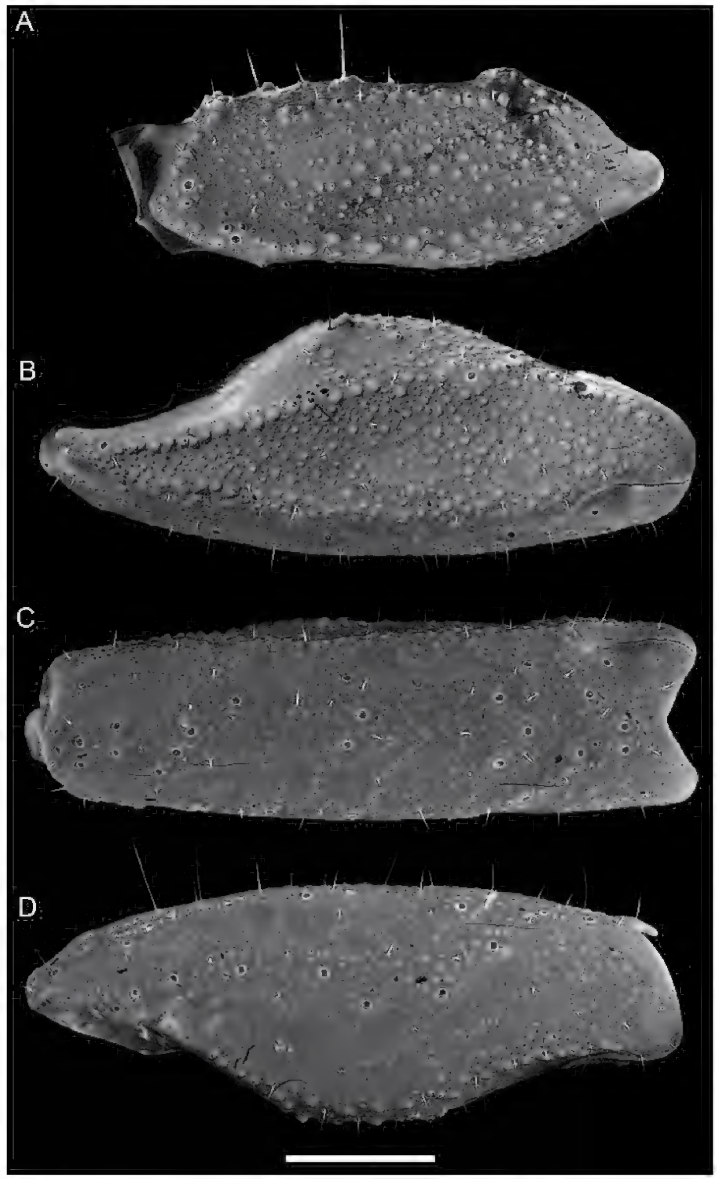

Fig. 36. *Chactopsis curupira*, n. sp., paratype ♂ (MZSP), dextral pedipalp segments. **A.** Femur. **B–D.** Patella. **A, B.** Dorsal aspect. **C.** External aspect. **D.** Ventral aspect. Scale bar = 1 mm.

Color: Base color dark chestnut brown, with dark brown spots on carapace, tergites, sternite VII, metasoma, and pedipalps; sternites III–VI, coxosternal region chestnut yellow with slight brown spots; chelicerae and legs yellow with brown spots; pectines white; aculeus slightly darker than telson vesicle. Cheliceral manus, dorsal surfaces with fine reticulate pigmentation, becoming contiguous distally near base of fixed finger; fixed and movable fingers entirely pigmented. Carapace, median ocular tubercle and surfaces around lateral ocelli very densely pigmented; anteromedian longitudinal sulcus, median lateral and posterolateral surfaces densely pigmented; posteromedian longitudinal sulcus faintly pigmented; postocular sulcus unpigmented. Pedipalp femur, dorsal, external, and internal surfaces, and all carinae densely pigmented, ventral surfaces

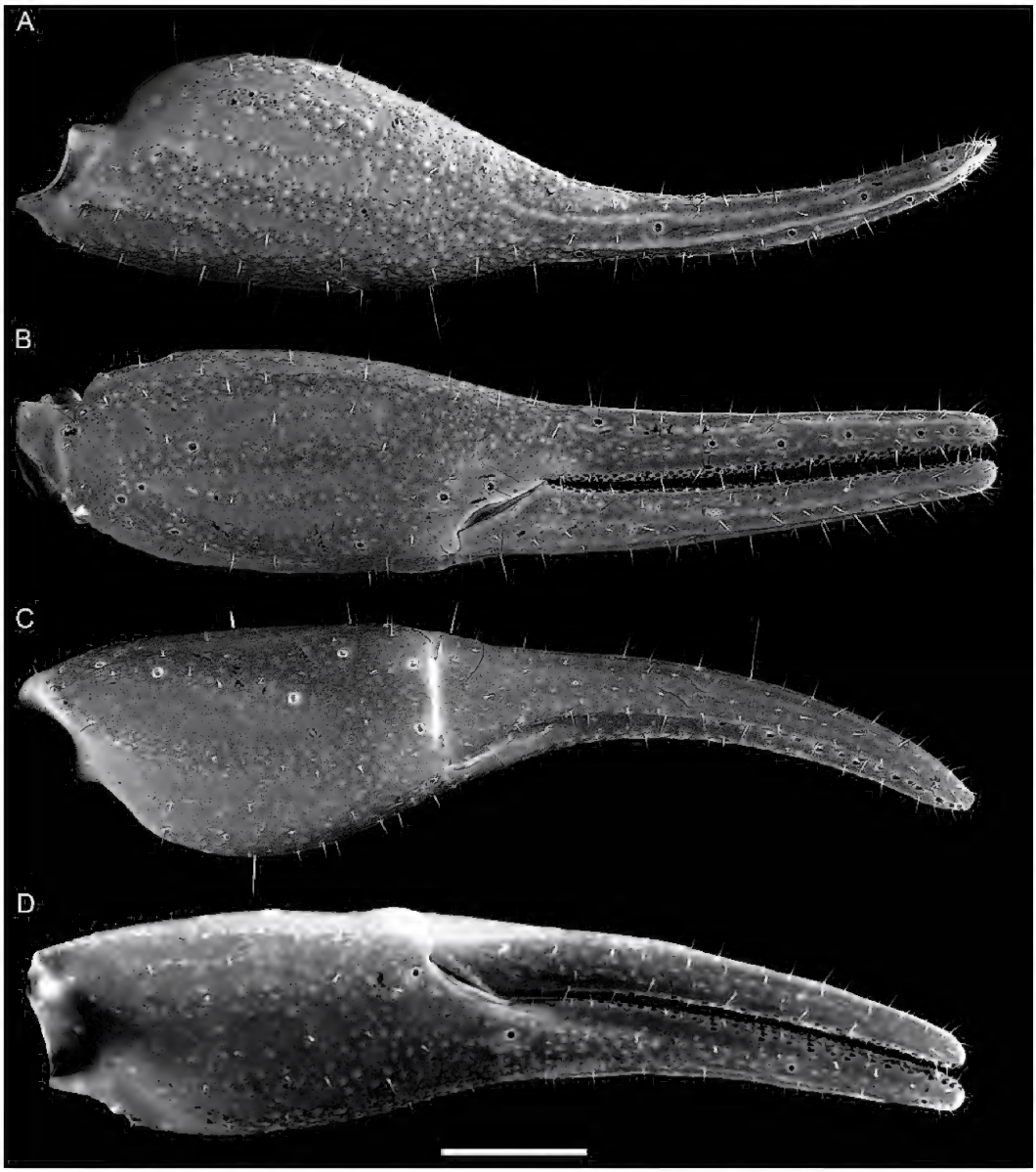

Fig. 37. *Chactopsis curupira*, n. sp., paratype ♂ (MZSP), dextral pedipalp chela. **A.** Dorsal aspect. **B.** External aspect. **C.** Ventral aspect. **D.** Internal aspect. Scale bar = 1 mm.

unpigmented; patella, dorsal and internal surfaces densely pigmented, with pigmentation stripes along DE and DI carinae, external surface with pigmentation stripe along EM carina and faint, irregular pigmentation throughout, ventral surface mostly unpigmented, except for pigmentation stripe along VE carina; chela densely pigmented, with pigmentation stripes along D, SD, DS, DMA, DI, E, and VE carinae, dorsal pigmentation stripes not contiguous distally at base of fixed finger, whereas external stripes contiguous, IM and VI carinae unpigmented; fixed and movable fingers unpigmented. Legs, femur, patella, and tibia, pro- and retrolateral surfaces faintly pigmented. Tergites I–VI

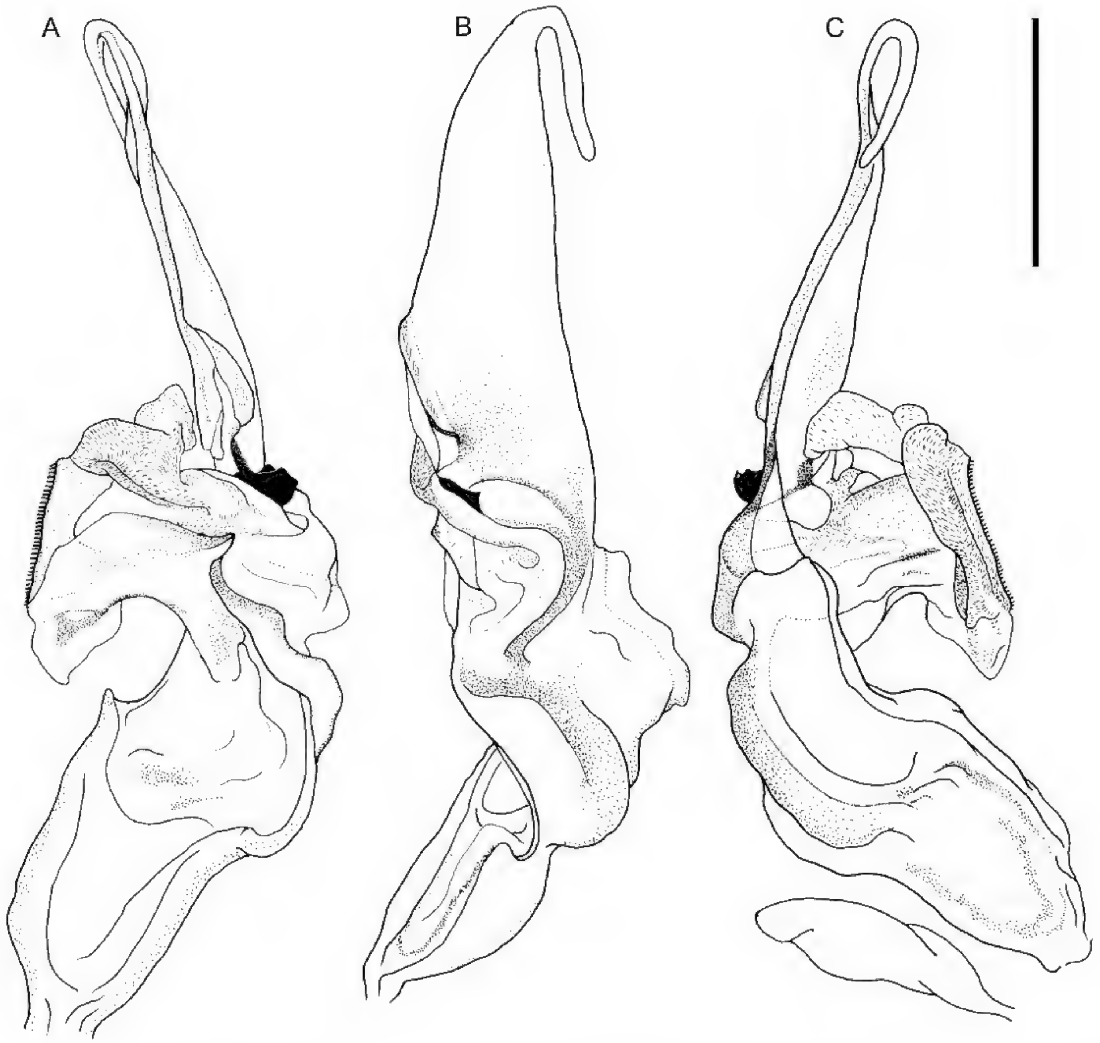

Fig. 38. *Chactopsis curupira*, n. sp., holotype ♂ (MZSP), sinistral hemispermatophore. **A.** Ental aspect. **B.** Dorsal aspect. **C.** Ectal aspect. Scale bar = 1 mm.

densely pigmented in two broad lateral and one narrow median spots, leaving two small unpigmented areas submedially, forming two stripes longitudinally across tergites; VII densely pigmented throughout. Sternite III mostly unpigmented, IV and V faintly pigmented along lateral margins, VI pigmented from spiracles to lateral margins, VII densely pigmented, more so laterally, with two small unpigmented areas submedially near anterior margin. Metasomal segments I–IV, densely pigmented, dorsal surfaces each with pigmentation stripes along DSM and DL carinae, surfaces between DSM carinae densely pigmented, contiguous with pigmentation along posterior margins of segment; lateral surfaces each with pigmentation stripes along ML carinae and reticulate pigmentation along LIM and LSM carinae, surfaces between DL and ML carinae pigmented only near posterior margins of segment, surfaces between ML and LIM carinae pigmented on posterior three-quarters of segment, surfaces between LIM and VL carinae pigmented on posterior three-quarters of segment I, posterior half of II and III, and posterior third of IV; porous areas unpigmented; ventral surfaces each with three pigmentation stripes along VM and

paired VL carinae, contiguous in posterior third of segment (VM pigmentation stripe not contiguous with lateral pigmentation in two specimens). Metasomal segment V, dorsal surface with paired, narrow DSM pigmentation stripes in anterior half of segment, becoming broader medially and contiguous with narrow DM pigmentation stripe in posterior quarter and with paired stripes of pigmentation along DL carinae in posterior half; lateral surfaces with faint reticulate pigmentation along LIM and LSM carinae, LIM pigmentation contiguous with VL pigmentation stripe in posterior half of segment, and with pigmentation stripes along ML carinae, contiguous with VL pigmentation in posterior third; ventral surface with three broad pigmentation stripes along VM and paired VL carinae, contiguous in posterior third of segment, and with fine pigmentation stripes along VSM carinae in anterior half, contiguous with dense pigmentation of surfaces between VL and VSM carinae in posterior half of segment. Telson vesicle, dorsal surface densely pigmented throughout; ventral surface with two broad VL and one narrow VM pigmentation stripes, separated by two narrow, unpigmented stripes.

Chelicerae: Movable finger with well-developed serrula, occupying slightly less than half its length; ventral subdistal tooth present.

Carapace: Anterior margin with moderate median notch and several microsetae (fig. 10E); posterior margin sublinear with shallow median notch and few microsetae. Surfaces with variable coarse and fine granulation throughout (fig. 10E), interocular and circumocular surfaces more coarsely granular, nongranular surfaces slightly punctate with few microsetae. Median ocelli half an ocular diameter apart. Anteromedian longitudinal sulcus finely granular, nongranular surfaces punctate; other sulci smooth.

Pedipalps: Femur, length/width ratio, ♂, 2.75–3.13 (n = 10; mean = 2.88); DE, DI, and VI carinae complete, granular (fig. 36A); EM carina restricted to distal half of segment, slightly granular; VM carina restricted to proximal half of segment, granular proximally, becoming less so medially; VE carina absent; IM carina vestigial, reduced to three prominent, isolated granules in proximal half of segment; dorsal intercarinal surface with variable fine and coarse granulation; external intercarinal surface smooth; ventral intercarinal surface finely granular in proximal half of segment, smooth and slightly punctate in distal half; internal intercarinal surface finely granular. Patella, length/width ratio, ♂, 2.63–2.92 (n = 10; mean = 2.75); DE, DI, and VI carinae complete, granular (fig. 36B–D); EM and VE carinae obsolete, reduced to punctation and weak granulation; DPP and VPP comprising moderate proximal granule and three or four smaller granules, VPP less developed than DPP; dorsal intercarinal surface coarsely and densely granular; external intercarinal surfaces densely punctate; ventral intercarinal surfaces mostly smooth, and slightly punctate; internal intercarinal surface sparsely granular. Chela manus slightly incrassate, fingers relatively elongated (fig. 37); chela length/width ratio, ♂, 4.15–4.48 (n = 10; mean = 4.29); length/height ratio, ♂, 4.19–4.69 (n = 10; mean = 4.41). Manus and fingers, intercarinal surfaces weakly granular, nongranular surfaces densely punctate, and covered with scattered microsetae, more so on fingers; D carina weakly granular and punctate along entire length of manus and proximal third of fixed finger, becoming costate on distal two-thirds of finger; SD carina restricted to proximal third of manus, weakly granular and punctate; DS and DMA carinae complete, weakly granular and punctate on manus, becoming costate on fixed finger, DMA carina slightly more pronounced in proximal third of fixed finger, near *db* trichobothrium; DI carina discontinuous, interrupted by two porous areas at base of fixed finger, weakly granular and punctate on manus, becoming costate on distal three-quarters of fixed finger; E, VE, IM, and VI carinae weakly granular and punctate, becoming more so distally, VI carina with three or four more prominent granules proximally. Fixed finger, median denticle row continuous, complete; flanked by 10 external and 10 internal denticles; internal accessory denticles arranged in two rows; first row continuous in proximal half of finger, interspersed with internal denticles, second (internalmost) row comprising 22 or 23 small denticles, discontinuous; external accessory denticles arranged in two rows, one adjacent to median row,

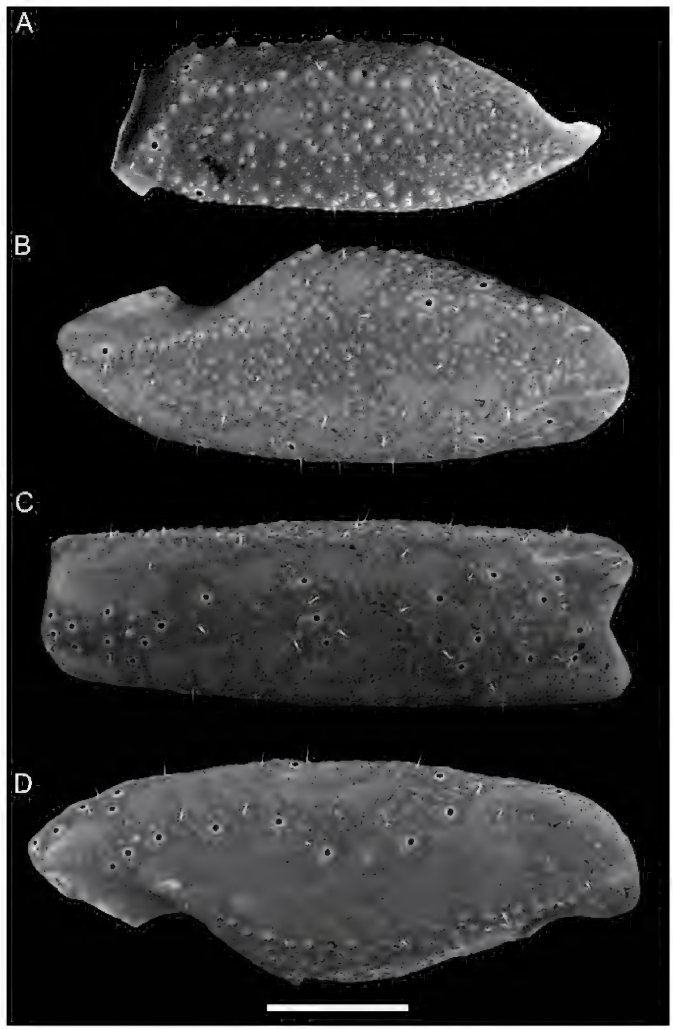

Fig. 39. *Chactopsis insignis* Kraepelin, 1912, ♂ (MHNC), dextral pedipalp segments. **A.** Femur. **B–D.** Patella. **A, B.** Dorsal aspect. **C.** External aspect. **D.** Ventral aspect. Scale bar = 1 mm.

continuous in proximal 80% of finger, second (externalmost) row, continuous in distal 80% of finger, interspersed with external denticles.

Trichobothria: Femur with three trichobothria (fig. 36A). Patella with 33 trichobothria (fig. 36B–D): two dorsal, seven ventral, 23 external, one internal; trichobothria v_6 and v_7 situated submedially, v_6 situated slightly closer to v_5 than to v_7; est_5 situated on VE margin, slightly distal to est_4; est_2 situated slightly proximal to, or in same axis as est_4; est_3 usually situated distal to est_2; em_1 usually situated slightly proximal to em_2; em_3 situated slightly proximal to or in same axis as em_1; esb_2 situated slightly distal to esb_3. Chela with 26 trichobothria (fig. 37): 10 situated on manus, three ventral, seven external; 16 situated on fixed finger, seven external, six dorsal, three internal (*it*, *isb*, *ib*); *ist* absent; *it* situated slightly proximal to *est*; *Est* situated equidistant between V_3 and Et_1; Et_1 and Et_2 situated in same axis; *eb* situated proximal to base of fixed finger; *db* situated between *esb* and *eb*, slightly closer to *esb*; dm_1 situated in same axis as et_3.

Tergites: Pretergites I–VII, surfaces punctate. Posttergites I–VI, surfaces finely and densely

Fig. 40. *Chactopsis insignis* Kraepelin, 1912, dextral pedipalp chela. **A.** ♂ (MHNC). **B–E.** ♀ (MHNC). **A, C.** External aspect. **B.** Dorsal aspect. **D.** Ventral aspect. **E.** Internal aspect. Scale bars = 1 mm.

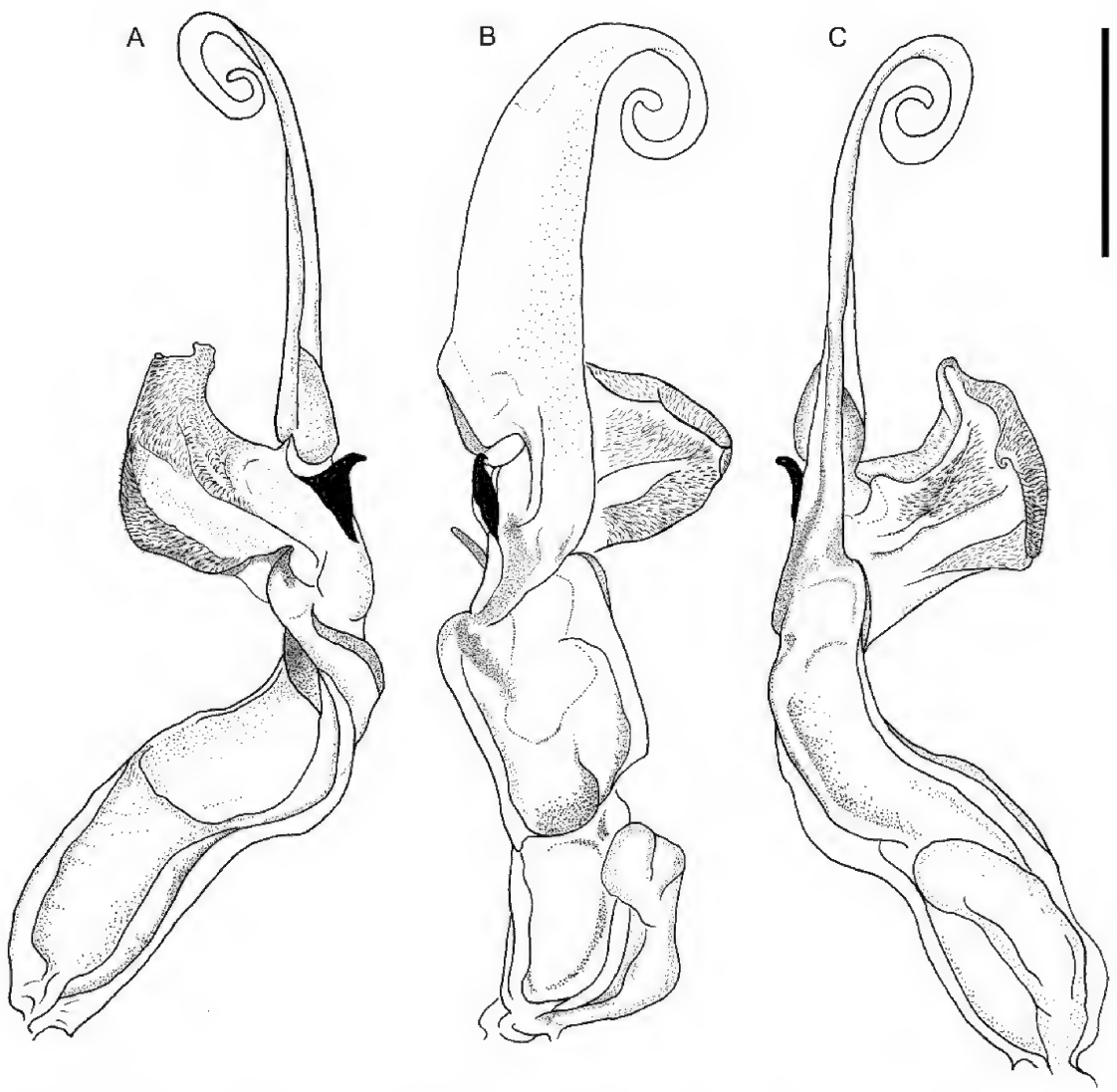

Fig. 41. *Chactopsis insignis* Kraepelin, 1912, ♂ (MPEG), sinistral hemispermatophore. **A.** Ental aspect. **B.** Dorsal aspect. **C.** Ectal aspect. Scale bar = 1 mm.

granular in anterior half, coarsely granular in posterior half (slightly more coarsely granular on IV–VI); dorsomedian and dorsosubmedian carinae absent. Posttergite VII, surface finely granular laterally, becoming coarsely granular medially; paired dorsosubmedian and dorsolateral carinae moderately developed on posterior two-thirds; posterior margin with transverse row of small granules.

Sternum: Ventral surface with 8–10 macrosetae, one pair situated anteriorly and three or four pairs on posterolateral lobes; apex and anterior margins with several microsetae (fig. 13D).

Pectines: Pectinal tooth count: ♂, 10 (n = 10), 11 (n = 10) (fig. 13D).

Sternites: Sternites III–VI, surfaces mostly smooth and densely punctate, except for few granules near lateral margins; VII, surface smooth and punctate medially, finely granular laterally, VL carinae weakly developed, each comprising few granules in medial third.

Metasoma: Segments I–IV, dorsal intercarinal surfaces finely and densely granular, lateral and ventral intercarinal surfaces coarsely granular (figs. 16A, 19A); small porous area situated posteriorly at LIM position on segments I–IV, slightly more developed on IV; DSM carinae complete on segments I–IV, moderately developed on I, weakly developed on II and III, vestigial, reduced to row of small granules on IV; DL carinae complete, granular, posterior granules forming low mound, slightly elevated on segments I and II, more pronounced on III and IV; LSM carinae vestigial, reduced to few small granules in median third of segments I–III, complete row of fine granules on IV; ML carinae complete, granular on segments I–IV; LIM carinae complete on segment I, reduced to posterior third of II, and to two or three posterior granules on III and IV; VL carinae complete, granular; VSM carinae obsolete on segment I, moderately developed, complete on II–IV (fig. 19A). Segment V, length/width ratio, ♂, 2.05–2.30 (n = 10; mean = 2.18); length/height ratio, ♂, 2.29–2.53 (n = 10; mean = 2.46); dorsal intercarinal surface finely granular; lateral and ventral intercarinal surfaces coarsely and densely granular (figs. 16A, 21D); porous area, situated posteriorly at LIM position, slightly more developed than on preceding segments; DL carinae restricted to anterior half of segment, obscured by granulation posteriorly; LSM carinae absent; ML carinae well developed in anterior two-thirds of segment; LIM carinae absent; VL carinae complete, well developed; VSM carinae vestigial, each comprising row of fine granules in anterior third of segment (fig. 21D); VM carina coarsely granular, restricted to anterior three-quarters of segment, obscured by scattered granulation in posterior quarter, and bifurcating posteriorly in some specimens.

Telson: Length/height ratio, ♂, 3.07–3.44 (n = 10, mean = 3.21). Vesicle globose; dorsal surface smooth; lateral and ventral surfaces finely and sparsely granular (fig. 21E), with several scattered microsetae. Aculeus short and gently curved.

Hemispermatophore: Lamina approximately same length as trunk (fig. 38A–C); apex wider proximally, curved, and tapering distally; flagellum short, straight, approximately one-quarter the length of lamina; ental margin with proximal fold, slightly elongated, similar in length to flagellum; articular flexure present, weakly developed; basal part moderately broadened, pedicel weakly developed. Trunk well developed, tortuous medially; sheath-shaped part moderately developed, approximately half the length of trunk, ventral concavity well developed; foot well developed, slightly sclerotized, half the length of trunk. Lobe region complex, well developed with two lobes; ental lobe moderately developed, slightly sclerotized, forming projection toward ental surface; median lobe well developed, extending ventrally, with additional sublobe entally, finely papillose entally and distally, distal margin with conspicuous row of spines; median trough deep, extending entire length of median lobe; dorsal apophysis sclerotized, crest shaped and bicuspid.

DISTRIBUTION: This species is known only from the type locality in the state of Pará, Brazil (fig. 1).

HABITAT: The type locality of this species falls within an area of primary rainforest.

Chactopsis insignis Kraepelin, 1912
Figures 1, 3C, 5E, 7, 9B, 11A, B, 12A, 14A, 16B, 19B, 20B, 21E, 22A, B, 39, 40, 41; table 5

Chactopsis insignis Kraepelin, 1912: 87, 88, figs. 10–12; Mello-Leitão, 1932: 34; Werner, 1934: 369; Mello-Leitão, 1945: 117, 118; Scorza, 1954c: 198 (part); Bücherl, 1969: 769; Esquivel de Verde and Machado-Allison, 1969: 31 (part); Aguilar and Meneses, 1970: 2; Vachon, 1974: figs. 15 (5), 177, 190–192; Soleglad, 1976: 300, 301; Francke, 1977: 76; González-Sponga, 1982: 127; 1984a: 53; Lourenço, 1986a: 564, fig. 23, table II; 1986b: 165, fig. 5; Lourenço and Francke, 1986: 550, 551, 552, figs. 1, 10–14, map 1; Lourenço, 1991: 117; 1994b: 157; 1997: 599; Lourenço and Pinto-da-Rocha, 2000: 264; Sissom, 2000: 312; Soleglad and Sissom, 2001: 29, 30, 92, figs. 11, 57, 151, 172, 181, 197, 217; Lourenço, 2002a: 221, 222, fig. 517; 2002b: 429, 435, fig. 126; Soleglad and Fet, 2003a: 6, fig. 6; Botero-Trujillo, 2008: 34.

TYPE MATERIAL: Holotype ♀ (MNHN RS 0759), **PERU:** Upper Amazonas, Huallaga River, between Moyobamba [06°01′58″S 76°58′00″W, 880 m] and Iquitos [03°45′01″S 73°14′58″W, 90 m].

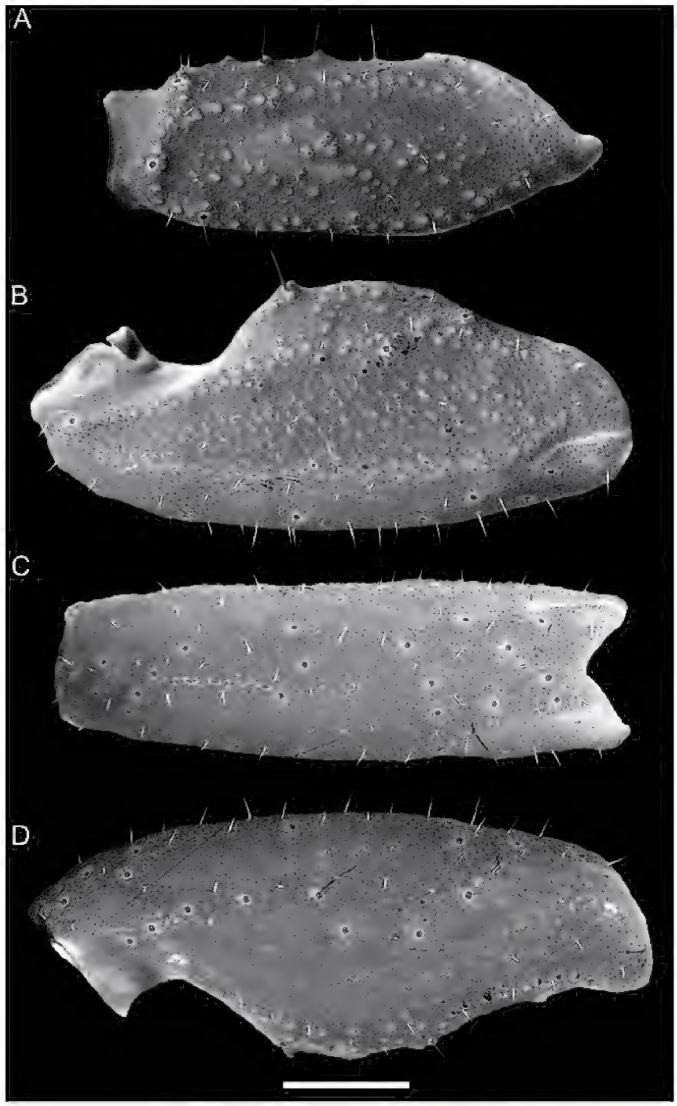

Fig. 42. *Chactopsis siapaensis* González-Sponga, 1991, ♀ (AMNH), dextral pedipalp segments. **A.** Femur. **B–D.** Patella. **A, B.** Dorsal aspect. **C.** External aspect. **D.** Ventral aspect. Scale bar = 1 mm.

NEW RECORDS: **BRAZIL: Amazonas:** *Municipio Jutaí*: Boa Vista, R.D.S. Cujubim, Mutum river, 04°39.077′S 68°19.391′W, 21–25.iii.2008, M.S. Hoogmoed and A. Jerozolimski, 2 ♂ (MPEG). **PERU: Ucayali Department:** *Coronel Portillo Province*: Pucallpa [08°23′02″S 74°32′58″W, 160 m], 9.xi.1946, J.C. Pallister, 1 ♂ (AMNH). **Loreto Department:** *Maynas, Fernando Lores Province*: Comunidad Diamante, Quebrada Blanco, 04°22.268′S 73°09.708′W, 113 m, 26.ii.2008, C. Gil, E. Guerra, and J.A. Ochoa, rainforest, collected at night with UV light, 1 ♂ (AMNH), 1 ♀ (AMNH [LP 8420]), 2 ♂, 1 ♀ (MHNC).

DIAGNOSIS: *Chactopsis insignis* appears to be most closely related to *C. chullachaqui*, n. sp., and *C. siapaensis*, based on similarities in hemispermatophore morphology (figs. 8, 41, 44): flagellum short and curved; apex with ental fold situated proximally on ental margin; lamina with proximal constriction,

Fig. 43. *Chactopsis siapaensis* González-Sponga, 1991, dextral pedipalp chela. **A.** Holotype ♂ (MAGS). **B–E.** ♀ (AMNH). **A, C.** External aspect. **B.** Dorsal aspect. **D.** Ventral aspect. **E.** Internal aspect. Scale bars = 1 mm.

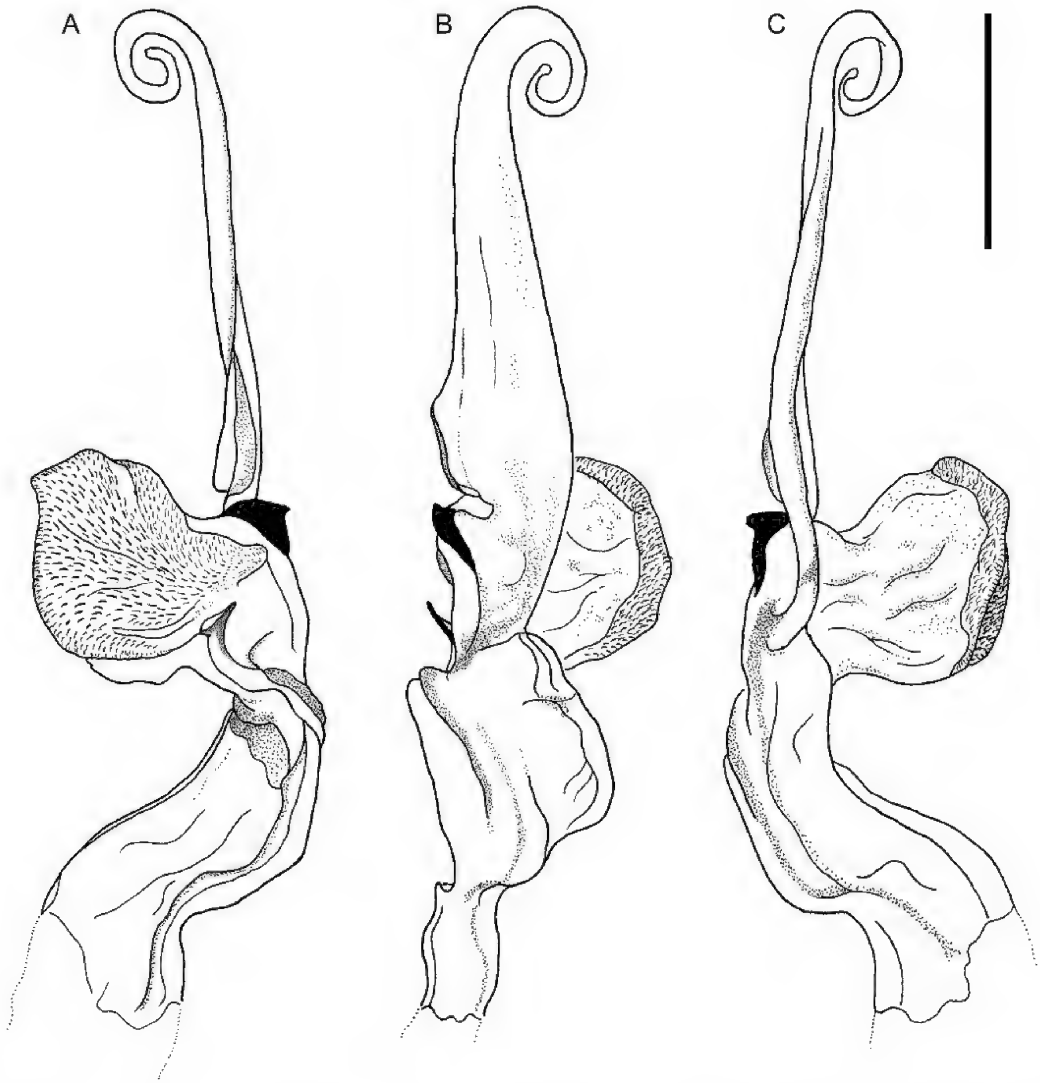

Fig. 44. *Chactopsis siapaensis* González-Sponga, 1991, holotype ♂ (MAGS), sinistral hemispermatophore. **A.** Ental aspect. **B.** Dorsal aspect. **C.** Ectal aspect. Scale bar = 1 mm.

forming conspicuous, elongated pedicel; lobe region without additional concave fold; median lobe well developed, densely papillose across entire surface; dorsal apophysis sclerotized, forming horn-shaped projection, slightly curved apically. The hemispermatophores of *C. amazonica*, *C. barajuri*, and *C. curupira*, n. sp. (figs. 25, 28, 37), differ from those of *C. insignis*, *C. chullachaqui*, n. sp., and *C. siapaensis* as follows (figs. 8, 41, 44): flagellum straight; apex with ental fold situated subproximally; pedicel of lamina short, not reaching dorsal apophysis; lobe region with additional concave fold; median lobe mostly apapillose, except for fine papillae distally and dorsally; dorsal apophysis forming crest-shaped projection.

Chactopsis insignis may be distinguished from *C. chullachaqui*, n. sp., and *C. siapaensis* as follows (figs. 34, 40, 43): pedipalp chelal trichobothrium *Est* situated closer to V_3 than to Et_1 in *C. insignis* and *C. siapaensis*, but equidistant between V_3 and Et_1 in *C. chullachaqui*, n. sp.; patellar trichobothrium esb_2 situated distal to esb_3 in *C. insignis* and *C. siapaensis*, but situated slightly proximal

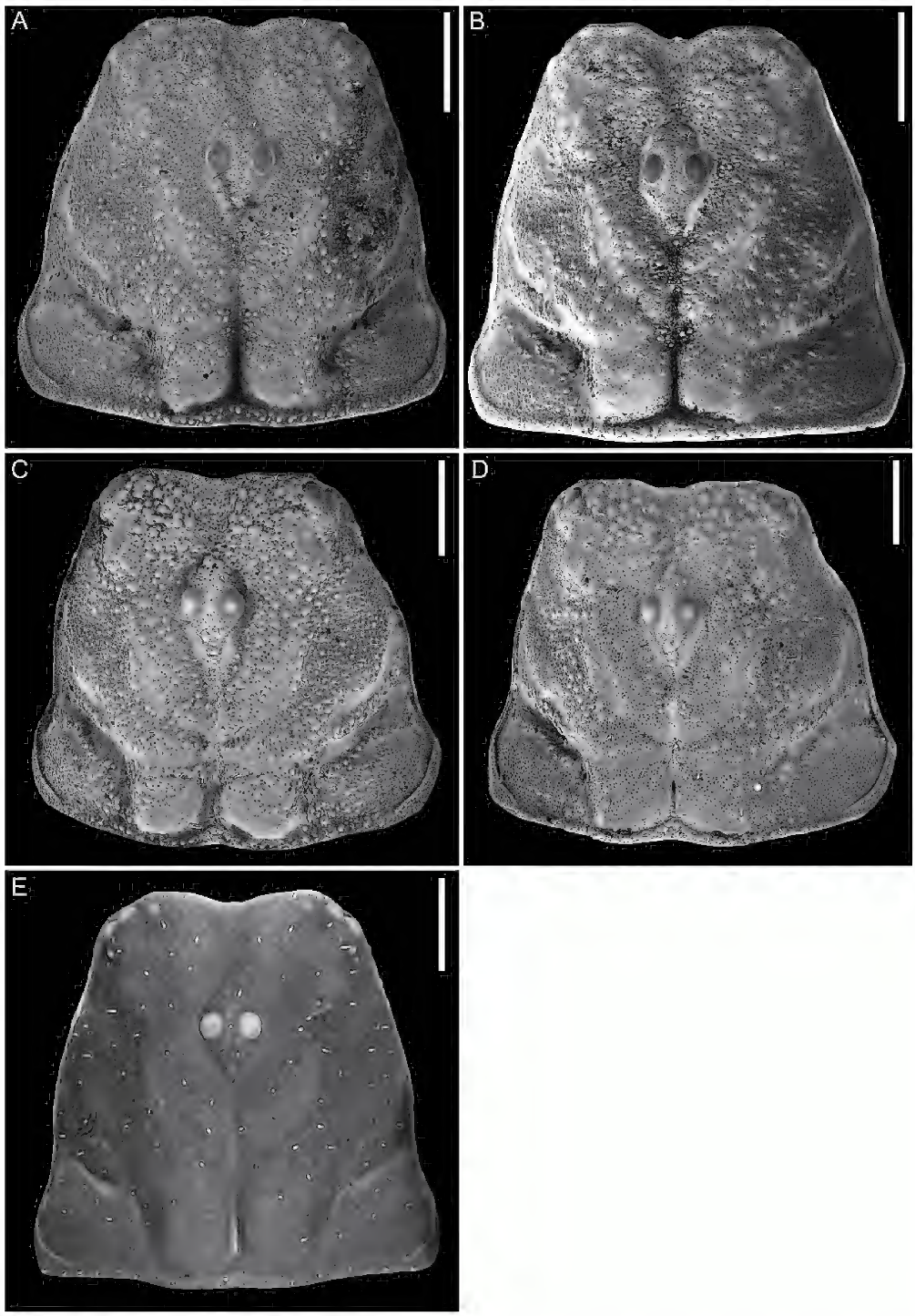

Fig. 45. *Chactopsoides*, n. gen., carapace, dorsal aspect. **A, B.** *Chactopsoides anduzei* (González-Sponga, 1982), n. comb. **A.** ♂ (AMNH). **B.** ♀ (AMNH). **C, D.** *Chactopsoides gonzalezspongai*, n. sp. **C.** Paratype ♂ (AMNH). **D.** Paratype ♀ (AMNH). **E.** *Chactopsoides marahuacaensis* (González-Sponga, 2004), n. comb., holotype ♀ (MAGS). Scale bars = 1 mm.

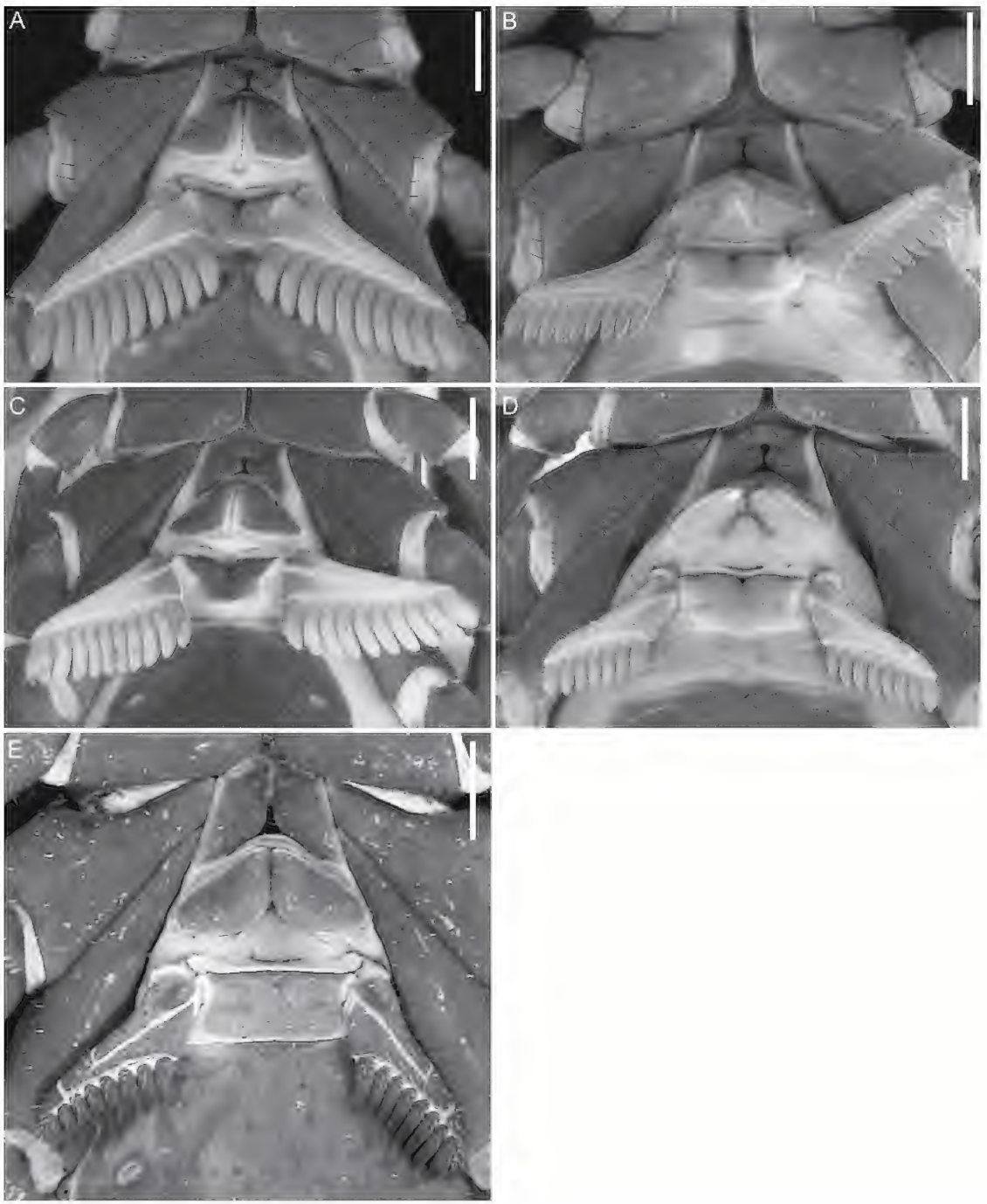

Fig. 46. *Chactopsoides*, n. gen., sternum and pectines, ventral aspect. **A, B.** *Chactopsoides anduzei* (González-Sponga, 1982), n. comb. **A.** ♂ (AMNH). **B.** ♀ (AMNH). **C, D.** *Chactopsoides gonzalezspongai*, n. sp. **C.** Paratype ♂ (AMNH). **D.** Paratype ♀ (AMNH). **E.** *Chactopsoides marahuacaensis* (González-Sponga, 2004), n. comb., holotype ♀ (MAGS). Scale bars = 1 mm.

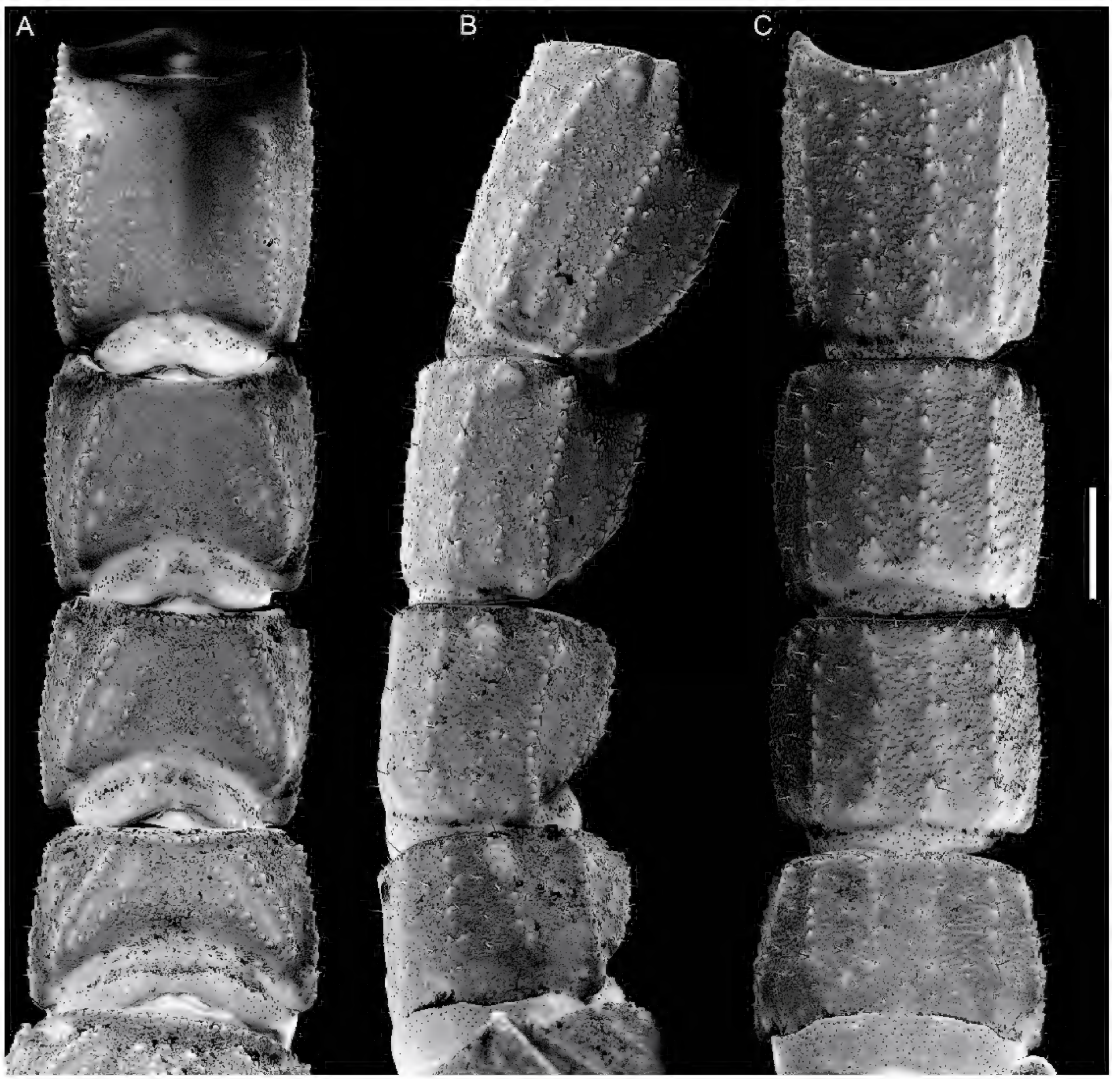

Fig. 47. *Chactopsoides anduzei* (González-Sponga, 1982), n. comb., ♂ (AMNH). Metasomal segments I–IV. **A.** Dorsal aspect. **B.** Lateral aspect. **C.** Ventral aspect. Scale bar = 1 mm.

to esb_3 in *C. chullachaqui*, n. sp.; pedipalp chela with three porous areas at base of fixed finger between DMA and DI carinae, and two additional porous areas in position of DI carina, in *C. insignis*, but with only two porous areas between DMA and DI carinae in *C. chullachaqui*, n. sp., and *C. siapaensis*; pectinal tooth count (♂), 8/8 in *C. chullachaqui*, n. sp., and *C. siapaensis*, compared with 9–10/10 in *C. insignis*; telson (♂), lateral surfaces mostly smooth, ventral surfaces with few weak granules in *C. insignis*, but lateral and ventral surfaces granular in *C. chullachaqui*, n. sp., and *C. siapaensis*. The three species also differ in hemispermatophore morphology: the lamina is approximately the same length as the trunk, with a broader apex in *C. insignis*, but longer than the trunk, with a more slender apex in *C. chullachaqui*, n. sp., and *C. siapaensis*; the dorsal apophysis is more pronounced in *C. insignis* and *C. chullachaqui*, n. sp., than in *C. siapaensis*; the median trough is well developed and the median lobe densely papillose, except along

Fig. 48. *Chactopsoides*, n. gen., metasomal segments III–V, lateral aspect. **A.** *Chactopsoides gonzalezspongai*, n. sp., paratype ♂ (AMNH). **B.** *Chactopsoides marahuacaensis* (González-Sponga, 2004), n. comb., holotype ♀ (MAGS). Scale bars = 1 mm.

the median trough, in *C. insignis* and *C. chullachaqui*, n. sp., whereas the median trough is weakly developed and the median lobe entirely papillose on the ental surface in *C. siapaensis*; the median lobe is considerably extended ventrally, with the distal margin less folded in *C. insignis* and *C. siapaensis*, but moderately extended ventrally, with the distal margin markedly folded toward the ectal surface in *C. chullachaqui*, n. sp.

REDESCRIPTION: Based on adults ♂ and ♀ listed in the Material Examined. Measurements of a ♂ and a ♀ recorded in table 4.

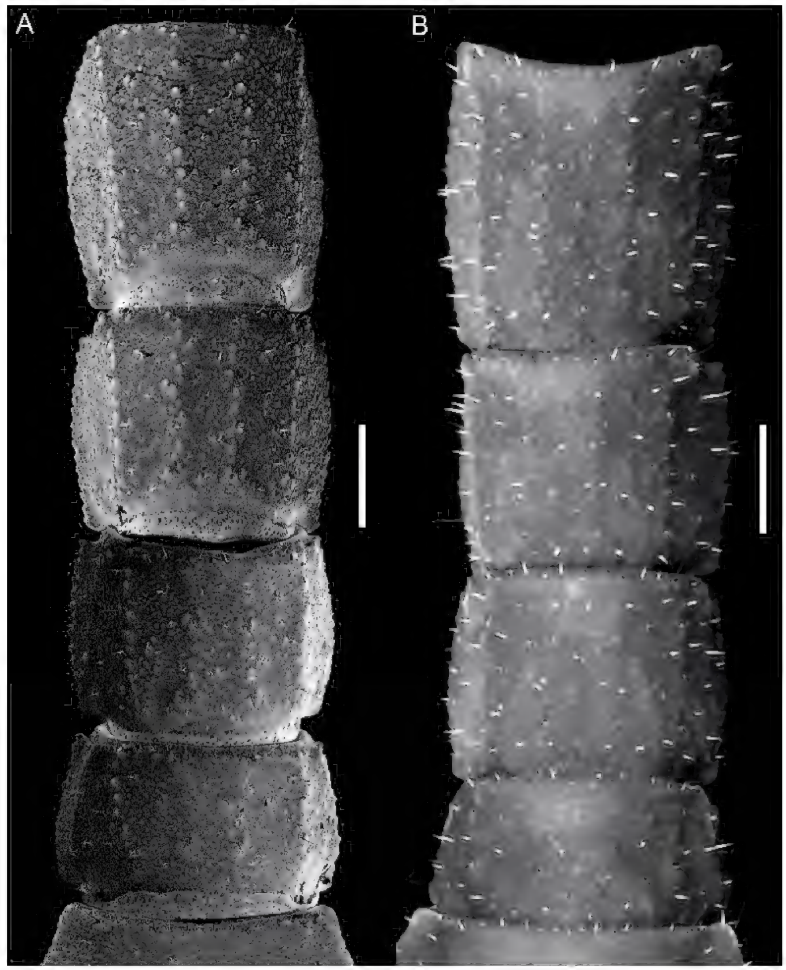

Fig. 49. *Chactopsoides*, n. gen., metasomal segments I–IV, ventral aspect. **A.** *Chactopsoides gonzalezspongai*, n. sp, paratype ♂ (AMNH). **B.** *Chactopsoides marahuacaensis* (González-Sponga, 2004), n. comb., holotype ♀ (MAGS). Scale bars = 1 mm.

Total length: ♂, 25.30–29.75 mm (n = 5; mean = 27.60); ♀, 34.30 mm (n = 1). According to Lourenço and Francke (1986), the holotype ♀ is 39.6 mm in total length.

Color: Base color brown to dark brown, with dark brown spots on carapace, tergites, sternite VII, metasoma, and pedipalps (fig. 5E); legs, sternites III–VI and coxosternal region light brown to yellow with brown spots; pectines yellow; aculeus slightly darker than telson vesicle. Cheliceral manus, dorsal surfaces with fine reticulate pigmentation, becoming contiguous distally near base of fixed finger; fixed and movable fingers entirely pigmented. Carapace, densely pigmented throughout, median ocular tubercle and surfaces around lateral ocelli very densely pigmented; anteromedian and posteromedian longitudinal sulci densely pigmented, postocular sulcus faintly pigmented. Pedipalp femur, dorsal, external, and internal surfaces, and all carinae densely pigmented, ventral surfaces unpigmented; patella, dorsal and internal surfaces densely pigmented, external surface with broad pigmentation stripe along EM carina and faint, irregular pigmentation throughout, ventral surface mostly unpigmented, except for pigmentation stripes along VI and VE carinae; chela with pigmentation stripes along D, SD, DS,

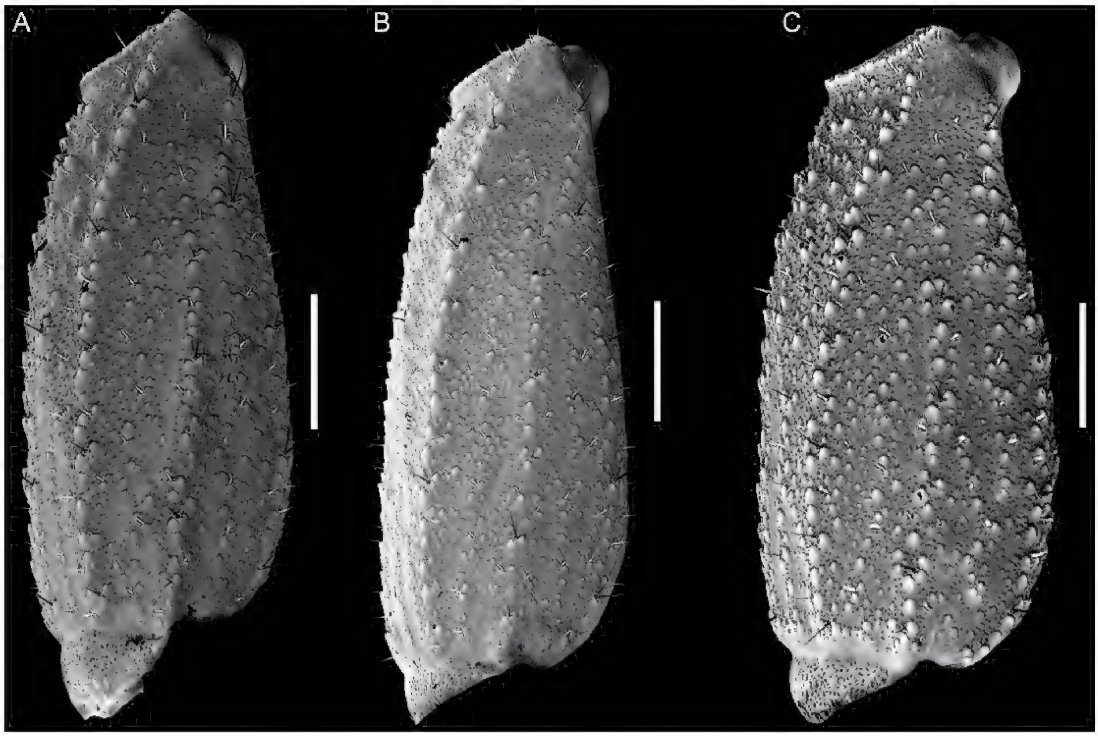

Fig. 50. *Chactopsoides*, n. gen., metasomal segment V, lateral aspect. **A, B.** *Chactopsoides anduzei* (González-Sponga, 1982), n. comb. **A.** ♂ (AMNH). **B.** ♀ (AMNH). **C.** *Chactopsoides gonzalezspongai*, n. sp., paratype ♀ (AMNH). Scale bars = 1 mm.

DMA, DI, E, IM, VI and VE carinae, contiguous at base of fingers, VI pigmentation stripes faint; fingers pigmented on proximal half. Legs, femur, patella and tibia, prolateral surfaces densely pigmented, retrolateral surfaces faintly pigmented. Tergites densely pigmented throughout, without unpigmented stripes. Sternum pigmented in anterior half. Sternites III–VI, faintly pigmented throughout, more so laterally; VII densely pigmented, except for two small unpigmented areas submedially near anterior margin. Metasomal segments I–IV, dorsal surfaces each with pigmentation stripes along DSM and DL carinae, surfaces between DSM carinae densely pigmented, forming subtriangular spots, contiguous with pigmentation along posterior margins of segment; lateral surfaces each with pigmentation stripes along ML carinae and reticulate pigmentation along LIM and LSM carinae, surfaces between DL and ML carinae densely pigmented in posterior third of segment, surfaces between ML and VL carinae densely pigmented throughout or in posterior two-thirds; ventral surfaces each with three pigmentation stripes along VM and paired VL carinae, contiguous in posterior two-thirds of segment I, posterior half of II and III, and posterior third of III. Metasomal segment V, all surfaces and carinae densely pigmented; lateral surface with reticulate pigmentation along LSM carinae, and dense pigmentation stripes along ML carinae, surfaces between ML and VL carinae with reticulated pigmentation in anterior half of segment and densely pigmented in posterior half; ventral surface with three dense pigmentation stripes along VM and paired VL carinae, contiguous in posterior third of segment, and with fine pigmentation stripes along VSM carinae in anterior half, contiguous with posterior pigmentation. Telson vesicle, dorsal surface densely pigmented, becoming paler posteriorly; ventral surface with two broad VL and one narrow VM

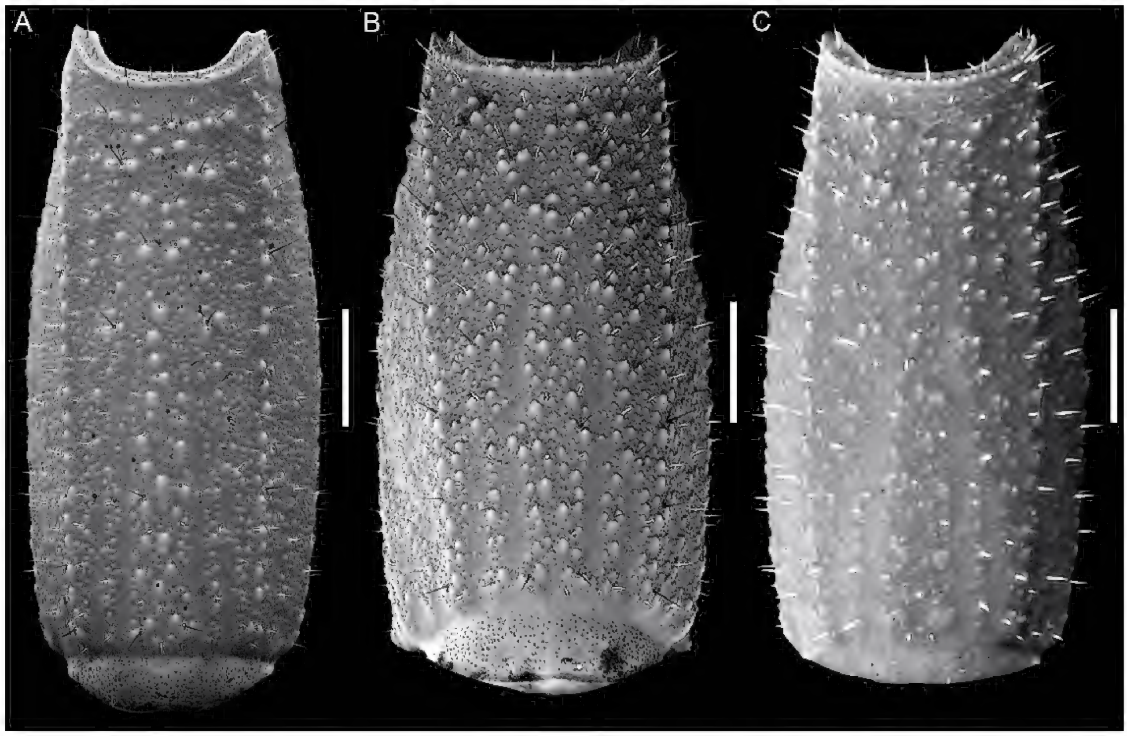

Fig. 51. *Chactopsoides*, n. gen., metasomal segment V, ventral aspect. **A.** *Chactopsoides anduzei* (González-Sponga, 1982), n. comb., ♂ (AMNH). **B.** *Chactopsoides gonzalezspongai*, n. sp., paratype ♀ (AMNH). **C.** *Chactopsoides marahuacaensis* (González-Sponga, 2004), n. comb., holotype ♀ (MAGS). Scale bars = 1 mm.

pigmentation stripes, separated by two narrow, unpigmented stripes.

Chelicerae: Movable finger with well-developed serrula, occupying slightly less than half its length; ventral subdistal tooth present.

Carapace: Anterior margin with moderate median notch and several microsetae (fig. 11A, B); posterior margin sublinear, without microsetae. Interocular surfaces coarsely granular, more so in ♂; circumocular, anterolateral, median lateral, and posterolateral surfaces with variable fine and medium granulation, nongranular surfaces slightly punctate with few microsetae (♂) or entirely smooth, shiny, and punctate (♀) (fig. 11B). Median ocelli half an ocular diameter apart. Anteromedian longitudinal sulcus finely granular (♂) or punctate (♀); other sulci smooth.

Pedipalps: Femur, length/width ratio, ♂, 2.84–3.05 (n = 5, mean = 2.91); ♀, 2.80 (n = 1); DE, DI, and VI carinae complete, granular (fig. 39A); EM carina restricted to distal third of segment, weakly granular (♂) or absent (♀); VM carina weakly granular, restricted to proximal third of segment, obscured by fine granulation distally (♂) or absent (♀); VE carina absent; IM carina vestigial, reduced to three prominent, isolated granules in proximal half of segment; dorsal intercarinal surface with variable fine and coarse granulation, more so in ♂, and slightly punctate (♀); external, ventral, and internal intercarinal surfaces finely granular (♂) or smooth and punctate (♀). Patella, length/width ratio, ♂, 2.73–2.84 (n = 5; mean = 2.79); ♀, 2.50 (n = 1); DI and VI carinae complete, granular (fig. 39B–D); DE carina complete, granular (♂) or obsolete, reduced to punctation (♀); EM and VE carinae obsolete, reduced to punctation (♀) or weak granulation (♂); VE carina restricted to proximal three-quarters of segment, slightly punctate in distal quarter; DPP and VPP each comprising moderate proximal granule and additional smaller

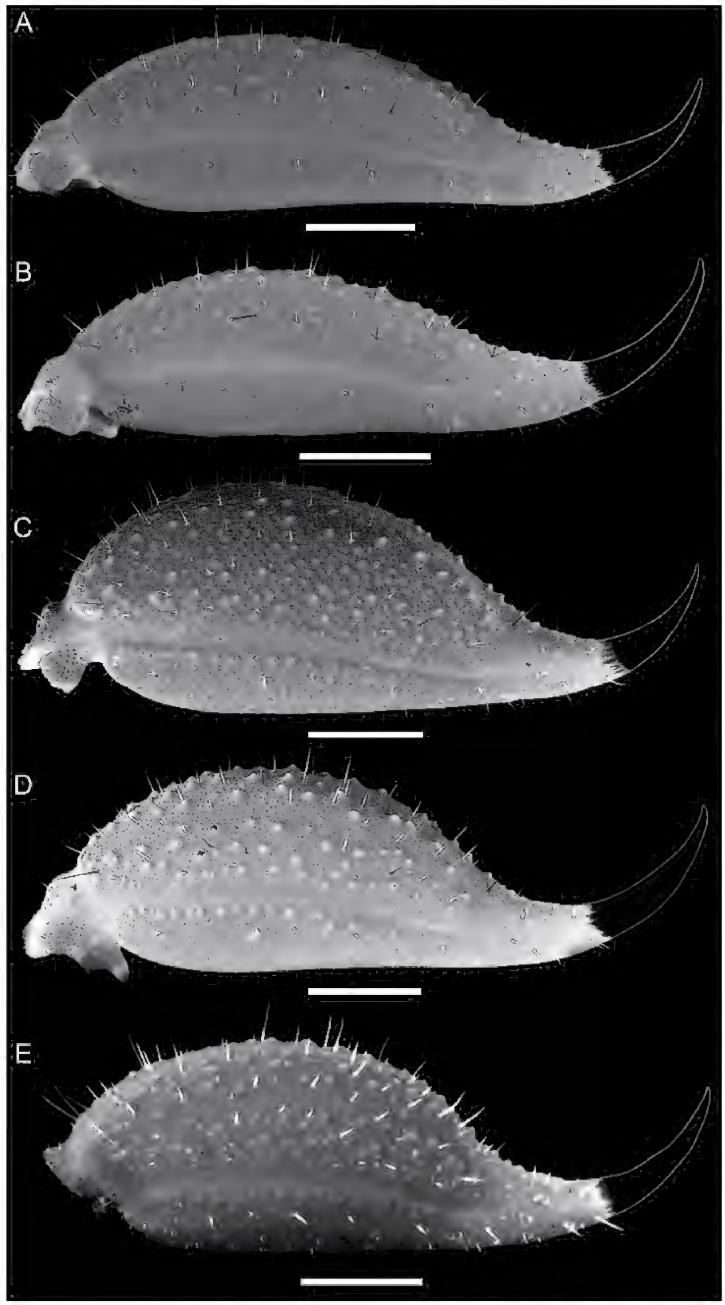

Fig. 52. *Chactopsoides*, n. gen., telson, lateral aspect. **A, B.** *Chactopsoides anduzei* (González-Sponga, 1982), n. comb. **A.** ♂ (AMNH). **B.** ♀ (AMNH). **C, D.** *Chactopsoides gonzalezspongai*, n. sp. **C.** Paratype ♂ (AMNH). **D.** Paratype ♀ (AMNH). **E.** *Chactopsoides marahuacaensis* (González-Sponga, 2004), n. comb., holotype ♀ (MAGS). Scale bars = 1 mm.

granules, VPP less developed than DPP; dorsal intercarinal surface densely granular (♂) or sparsely granular, nongranular surfaces punctate (♀); external intercarinal surface sparsely granular (♂) or smooth (♀), nongranular surfaces punctate; ventral intercarinal surface smooth and punctate; internal intercarinal surface densely granular. Chela

manus narrow (♂) or slightly incrassate (♀), fingers relatively elongated (fig. 40); chela length/width ratio, ♂, 4.46–4.87 (n = 5; mean = 4.62); ♀, 4.18 (n = 1); length/height ratio, ♂, 4.67–5.09 (n = 5; mean = 4.88); ♀, 4.38 (n = 1). Manus and fingers, intercarinal surfaces weakly granular, more so in ♂, nongranular surfaces densely punctate, more so in ♀, and covered with scattered microsetae, more densely so on fingers; D carina punctate, more so in ♀, and weakly granular (♂) on manus, weakly developed and costate on distal three-quarters of fixed finger; SD carina restricted to proximal third of manus, weakly granular (♂) or punctate (♀); DS carina complete, weakly granular and punctate on manus, becoming costate on fixed finger; DMA carina weakly granular and punctate on manus, becoming costate on fixed finger, well developed on proximal third of finger, becoming progressively less pronounced distally until trichobothrium dm_2, and becoming more pronounced distally thereafter; DI carina discontinuous, interrupted by three porous areas at base of fixed finger, weakly granular and punctate on manus, becoming costate on distal quarter of fixed finger; E, VE, and VI carinae punctate, more so in ♀, and weakly granular (♂); IM carina weakly granular and punctate, two porous areas on manus in place of IM carina. Fixed finger, median denticle row continuous, complete; flanked by 10 external and nine internal denticles; internal accessory denticles arranged in three rows, first row comprising few denticles, discontinuous in proximal half of finger, interspersed with internal denticles, second and third rows each comprising 28–30 denticles, discontinuous, restricted to distal two-thirds of finger; external accessory denticles arranged in two rows, one adjacent to median row, continuous in proximal 80% of finger, second (externalmost) row, continuous in distal 80% of finger, interspersed with external denticles.

Trichobothria: Femur with three trichobothria (fig. 39A). Patella with 33 trichobothria (fig. 39B–D): two dorsal, seven ventral, 23 external, one internal; trichobothrium v_6 situated slightly closer to v_5 than to v_7; est_5 situated on VE margin, slightly distal to est_4; est_2 situated proximal to est_3 and est_4; est_3 usually situated proximal to est_4 (slightly distal to est_4 observed in one case); em_1 usually situated slightly proximal to em_2 and em_3; esb_2 situated slightly distal to esb_3. Chela with 26 trichobothria (fig. 40): 10 situated on manus, three ventral, seven external; 16 situated on fixed finger, seven external, six dorsal, three internal (*it*, *isb*, *ib*); *ist* absent; *it* situated slightly proximal to, or in same axis as *est*; *Est* situated closer to V_3 than to Et_1; Et_1 and Et_2 situated in same axis; *eb* situated proximal to base of fixed finger; *db* situated between *esb* and *eb*, slighty closer to *esb*; dm_1 situated slightly proximal to et_3.

Legs: Prolateral surfaces granular, retrolateral surfaces smooth. Femur III, DI carina restricted to distal half of segment; DE and EM carinae obscured by granulation; VI carina complete. Patella III, DI carina complete; VI carina comprising few granules, restricted to distal half of segment; other carinae obscured by dorsal and external granulation. Basitarsus III setose; retrodorsal row of small subspiniform granules restricted to proximal two-thirds or medial third of segment; prodorsal row vestigial, comprising only two or three small subspiniform granules medially; one dorsal and two ventral rows of small brushlike spinules, retrodorsal and proventral rows restricted to distal third of segment, ventromedian row complete or restricted to distal two-thirds. Telotarsus III setose, pro- and retroventral rows each with 5–6 elongated macrosetae.

Tergites: Pretergites I–VII, surfaces punctate. Posttergites I–VI (fig. 12A), surfaces finely and densely granular, more coarsely so on posterior half of IV–VI (♂) or almost smooth and punctate, with sparse granulation on posterior half of IV–VI (♀); dorsomedian carina present only on VI, vestigial, comprising one or two posterior granules; dorsosubmedian carinae vestigial, comprising three or four posterior granules on III–VI (♂) or V and VI (♀). Posttergite VII, surface finely granular laterally (more so in ♂), becoming coarsely granular medially; paired dorsosubmedian and dorsolateral carinae moderately developed on posterior two-thirds; posterior margin with transverse row of small granules.

Sternum: Ventral surface with eight macrosetae, one pair situated anteriorly and three

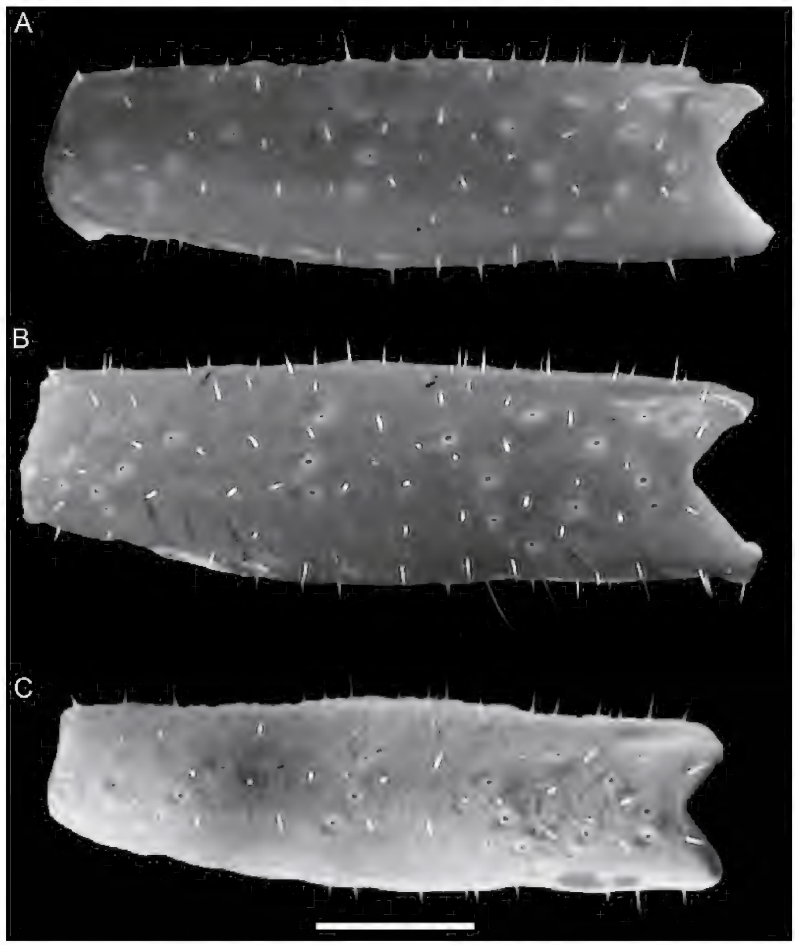

Fig. 53. *Chactopsoides anduzei* (González-Sponga, 1982), n. comb., dextral pedipalp patella, external surface, showing variation in trichobothrial pattern. **A.** ♀ (MAGS). **B.** ♀ (MAGS). **C.** ♂ (MHNLS). Scale bar = 1 mm.

pairs on posterolateral lobes; apex and anterior margins with several microsetae (fig. 14A).

Pectines: Pectinal tooth count: ♂, 9 (*n* = 9), 10 (3); ♀, 9 (2) (fig. 14A).

Sternites: Sternites III–VI, surfaces smooth, moderately (♀) or densely (♂) punctate; VII, surface smooth and punctate with sparse fine granules laterally, VL carinae absent (♀) or vestigial, each comprising one or two weak granules in medial third (♂).

Metasoma: Segments I–IV, dorsal intercarinal surfaces finely and densely granular (♂) or smooth and punctate (♀) (figs. 16B, 19B); lateral and ventral intercarinal surfaces coarsely and densely granular, nongranular surfaces slightly punctate (♂) (fig. 16B) or sparsely granular, nongranular surfaces densely punctate (♀); small porous area situated posteriorly at LIM position on segments I–IV; DSM carinae vestigial, comprising row of small granules on segments I–IV (♂) or restricted to two or three small granules in medial third of I and II (♀); DL carinae complete, granular, posterior granules forming low mound, more pronounced on segments III and IV; LSM carinae absent or vestigial, comprising few small granules in median third of segments I–IV; ML carinae complete, granular on segments I–IV; LIM carinae complete on segment I, restricted to posterior third of II, restricted to posterior third (♂) or comprising few posterior gran-

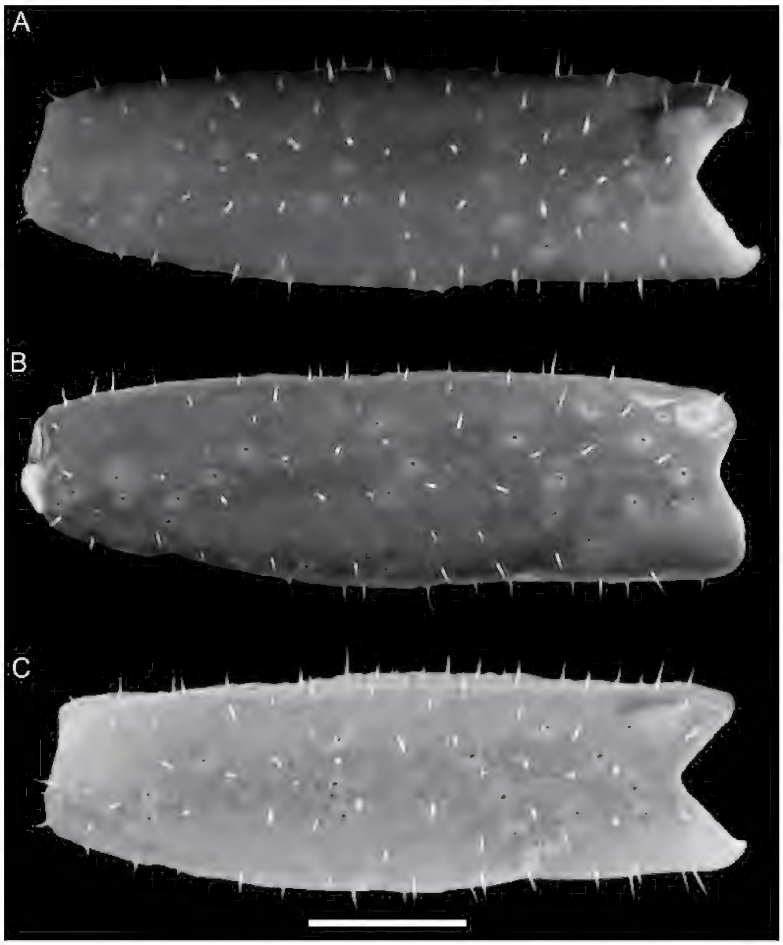

Fig. 54. *Chactopsoides anduzei* (González-Sponga, 1982), n. comb., dextral pedipalp patella, external surface, showing variation in trichobothrial pattern. **A.** ♀ (MAGS). **B.** ♀ (MAGS). **C.** ♀ (MHNLS). Scale bar = 1 mm.

ules (♀) on III, comprising two or three granules posteriorly on IV; VL carinae complete, well developed, granular; VSM carinae obsolete on segments I and II, complete, moderately developed on III, well developed on IV. Segment V, length/width ratio, ♂, 2.14 –2.34 (n = 5; mean = 2.21), ♀, 2.00 (n = 1); length/height ratio, ♂, 2.42–2.56 (n = 5; mean = 2.48), ♀, 2.30 (n = 1); dorsal intercarinal surface finely granular in anterior half, smooth in posterior half; lateral and ventral intercarinal surfaces densely granular (♂) or sparsely granular to smooth (♀) (figs. 16B, 19B, 20B); porous area, situated posteriorly at LIM position, moderately developed; DL carinae complete, obsolete in posterior half; LSM carinae absent; ML carinae moderately developed in anterior three-quarters of segment; LIM carinae absent; VL carinae complete, well developed; VSM carinae vestigial, comprising row of small granules in anterior third of segment; VM carina coarsely granular, restricted to anterior three-quarters of segment, bifurcating posteriorly (fig. 21E).

Telson: Length/height ratio, ♂, 3.37–3.54 (n = 5; mean = 3.43); ♀, 2.38 (n = 1). Vesicle slightly elongated; dorsal surface smooth; lateral surfaces mostly smooth, punctate, ventral surfaces finely and sparsely granular, nongranular surfaces punctate (♂) or lateral and ventral surfaces coarsely and sparsely

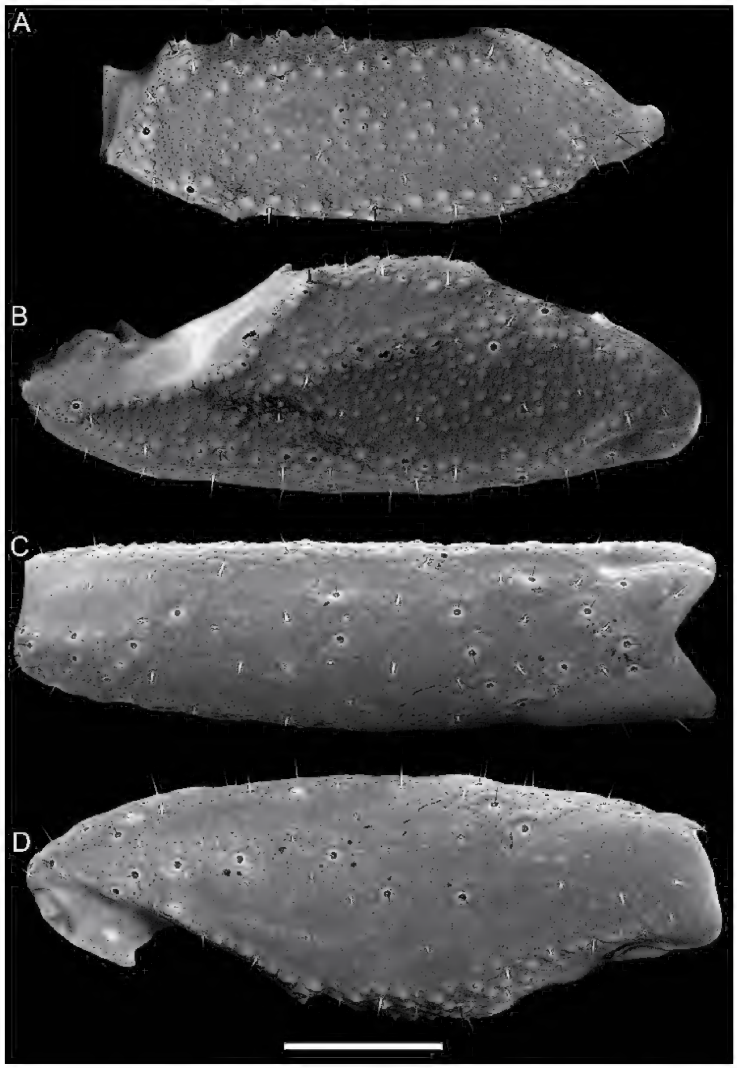

Fig. 55. *Chactopsoides anduzei* (González-Sponga, 1982), n. comb., ♂ (AMNH), dextral pedipalp segments. **A.** Femur. **B–D.** Patella. **A, B.** Dorsal aspect. **C.** External aspect. **D.** Ventral aspect. Scale bar = 1 mm.

granular, nongranular surfaces punctate (♀) (fig. 23A, B); ventral surfaces with scattered microsetae. Aculeus short and gently curved (♂) or slightly elongated and more strongly curved (♀).

Hemispermatophore: Lamina slightly elongated, approximately same length as trunk (fig. 40A–C); apex wider proximally, curved, and progressively tapering distally; flagellum short, strongly curved; ental margin with short proximal fold toward dorsal surface; articular flexure present; pedicel conspicuous, approximately as long as ental fold. Trunk well developed, slightly tortuous medially; sheath-shaped part approximately half length of trunk, ventral concavity well developed; foot weakly sclerotized, approximately half length of trunk. Lobe region well developed with two lobes; ental lobe moderately developed, sclerotized, forming projection toward ental surface; median lobe well developed, extending ventrally, ventral surfaces densely papillose, more so distally, except along median trough, distal margin moderately

Fig. 56. *Chactopsoides anduzei* (González-Sponga, 1982), n. comb., dextral pedipalp chela. **A.** ♂ (AMNH). **B–E.** ♀ (AMNH). **A, C.** External aspect. **B.** Dorsal aspect. **D.** Ventral aspect. **E.** Internal aspect. Scale bars = 1 mm.

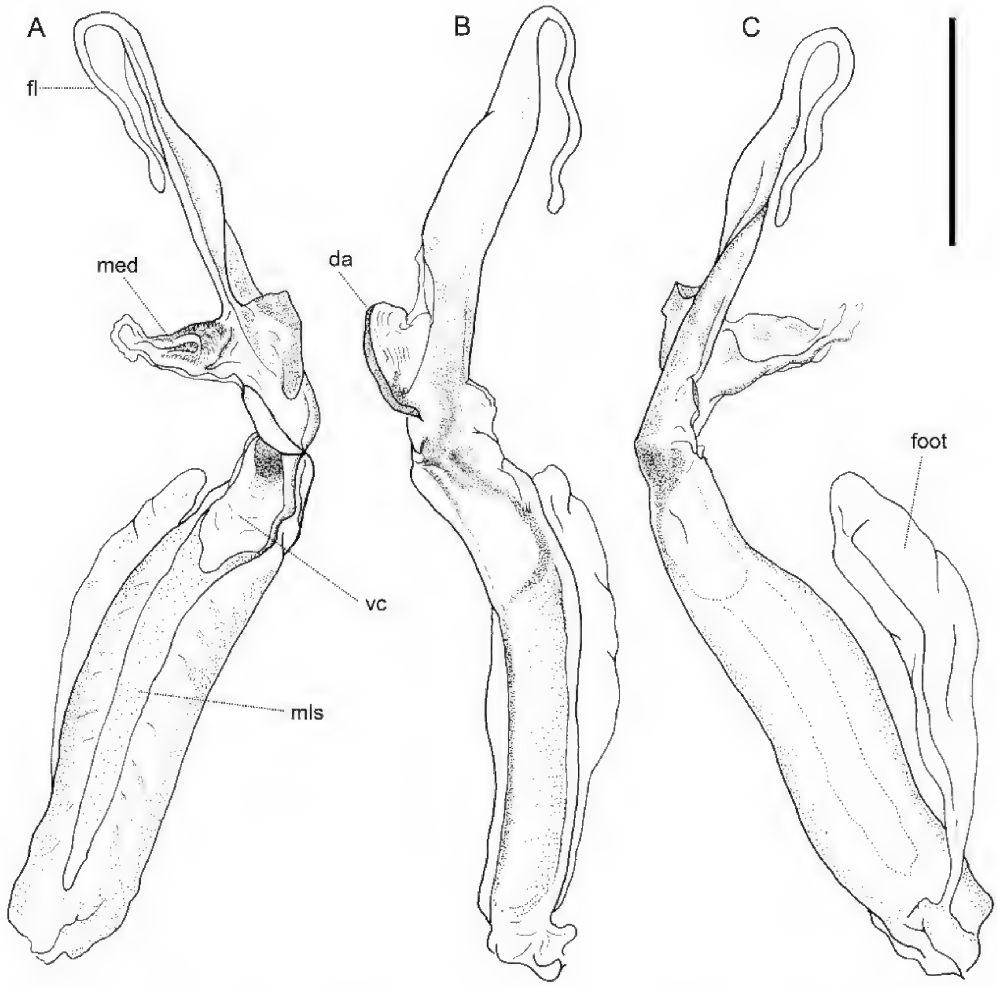

Fig. 57. *Chactopsoides anduzei* (González-Sponga, 1982), n. comb., ♂ (AMNH), sinistral hemispermatophore. **A.** Ental aspect. **B.** Dorsal aspect. **C.** Ectal aspect. Annotations: **da,** dorsal apophysis; **fl,** flagellum; **med,** median lobe; **mls,** median longitudinal sulcus; **vc,** ventral concavity. Scale bar = 1 mm.

folded, median trough deep, restricted to proximal two-thirds of median lobe; dorsal apophysis strongly sclerotized, horn shaped, slightly curved apically, almost reaching ental fold of apex.

REMARKS: Records of *C. insignis* from Venezuela (Scorza, 1954a, 1954b, 1954c; Esquivel de Verde and Machado-Allison, 1969), based on 1 ♂ and 9 ♀ from Ugueto (upper Orinoco River), are misidentifications. We examined some of these specimens, currently deposited at the MBUCV, and confirmed that they are congeneric with *Chactopsoides*, n. gen., but they are poorly preserved and it is difficult to establish whether they are conspecific with any described species.

DISTRIBUTION: *Chactopsis insignis* was described from an imprecise locality, between Iquitos and Moyobamba, in Peru (Kraepelin, 1912). Lourenço and Francke (1986) confirmed the presence of this species at Iquitos and Pucallpa, in the Peruvian Amazon, and Lourenço (2002a) reported it from the western part of the state of Amazonas, Brazil (fig. 1). We added two new records from adjacent areas of Peru and Brazil. This species is currently known from five localities in the departments of Loreto

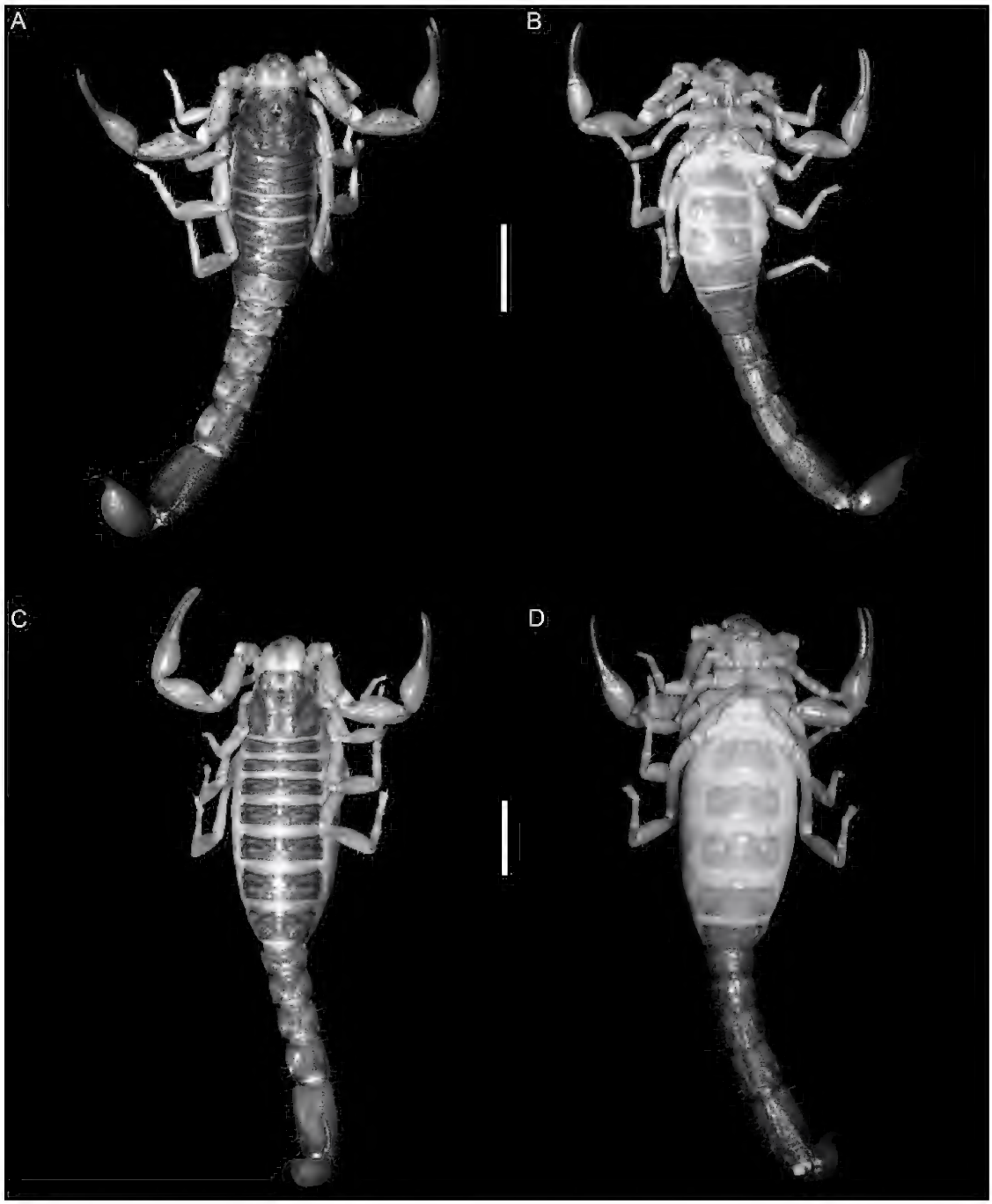

Fig. 58. *Chactopsoides gonzalezspongai*, n. sp., habitus. **A, B.** Paratype ♂ (MHNC). **C, D.** Paratype ♀ (MHNC) **A, C.** Dorsal aspect. **B, D.** Ventral aspect. Scale bar = 10 mm.

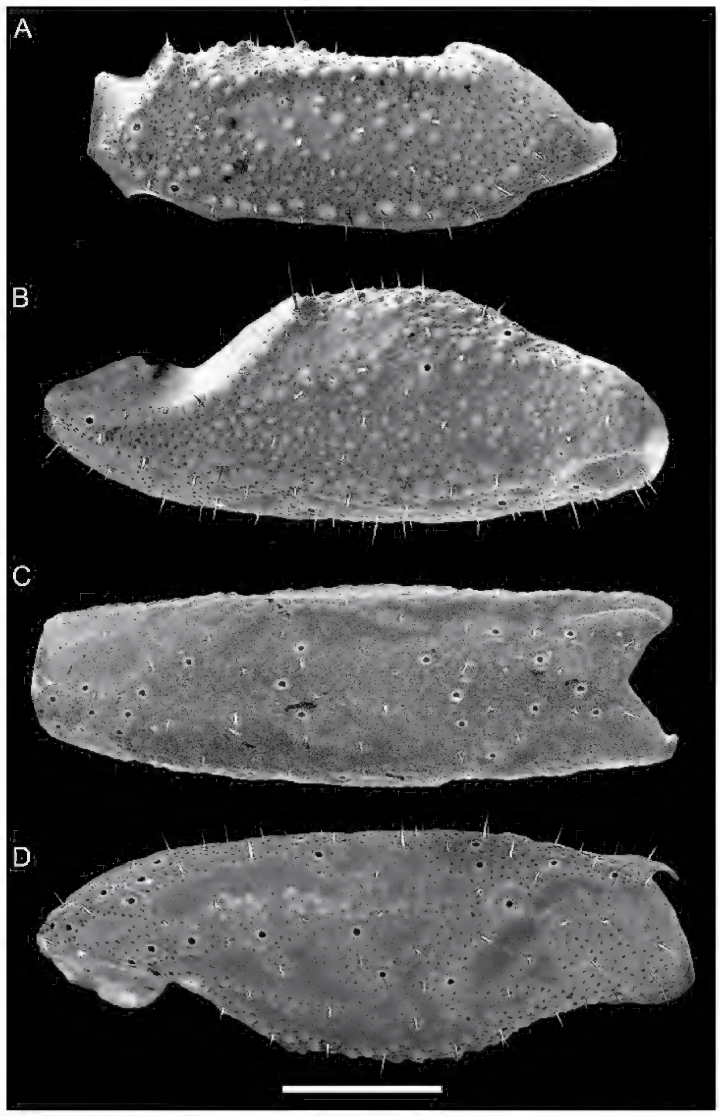

Fig. 59. *Chactopsoides gonzalezspongai*, n. sp., paratype ♂ (AMNH), dextral pedipalp segments. **A.** Femur. **B–D.** Patella. **A, B.** Dorsal aspect. **C.** External aspect. **D.** Ventral aspect. Scale bar = 1 mm.

and Ucayali, Peru, and the state of Amazonas, Brazil.

HABITAT: All known localities of *C. insignis* occur in primary rainforest in the Amazon basin (fig. 3C). Personally collected specimens from Peru were found at night by UV light detection, among leaf litter in terra firme forest. This species was found in sympatry with three buthids, *Tityus bastosi* Lourenço, 1984, *T. metuendus*, and a species of *Ananteris* Thorell, 1891.

Chactopsis siapaensis González-Sponga, 1991
Figures 1, 11C, D, 14B, C, 17A, 19C, 20C, 21F, 23C, D, 42, 43, 44

Chactopsis siapaensis González-Sponga, 1991: 32–37, 58–59, figs. 28–34, map 1; 1996: 111, 116, figs. 260–263; Sissom, 2000: 312; Soleglad and Sissom, 2001: 92; González-Sponga, 2001: 29, 41, 49, map 5; Lourenço, 2002b: 435; Rojas-Runjaic and de Sousa, 2007: 299; Botero-Trujillo, 2008: 34.

TYPE MATERIAL: Holotype ♂ [not ♀] (MAGS 4615), paratype ♂ (MAGS 4613),

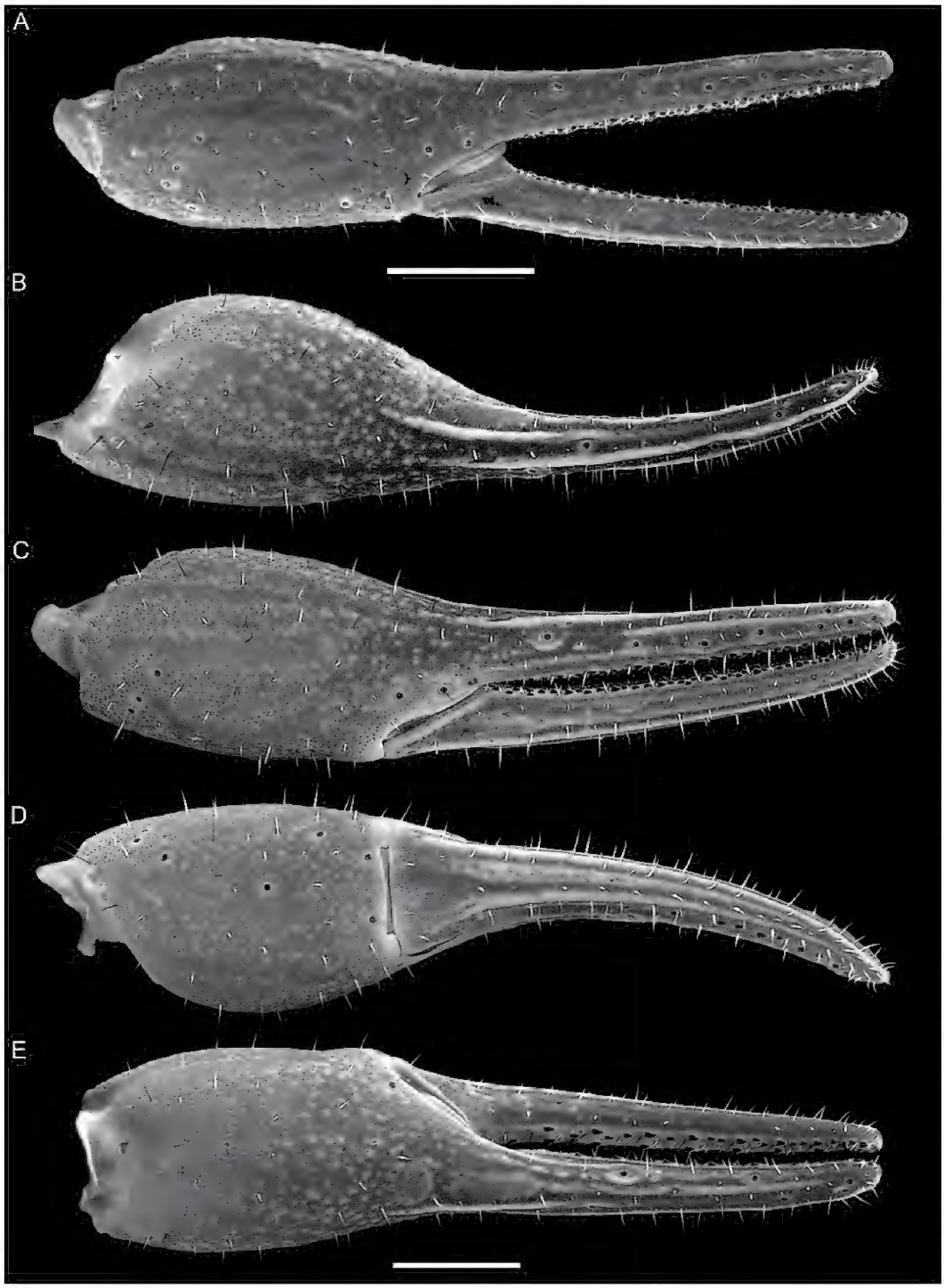

Fig. 60. *Chactopsoides gonzalezspongai*, n. sp., dextral pedipalp chela. **A.** Paratype ♂ (AMNH). **B–E.** Paratype ♀ (AMNH). **A, C.** External aspect. **B.** Dorsal aspect. **D.** Ventral aspect. **E.** Internal aspect. Scale bars = 1 mm.

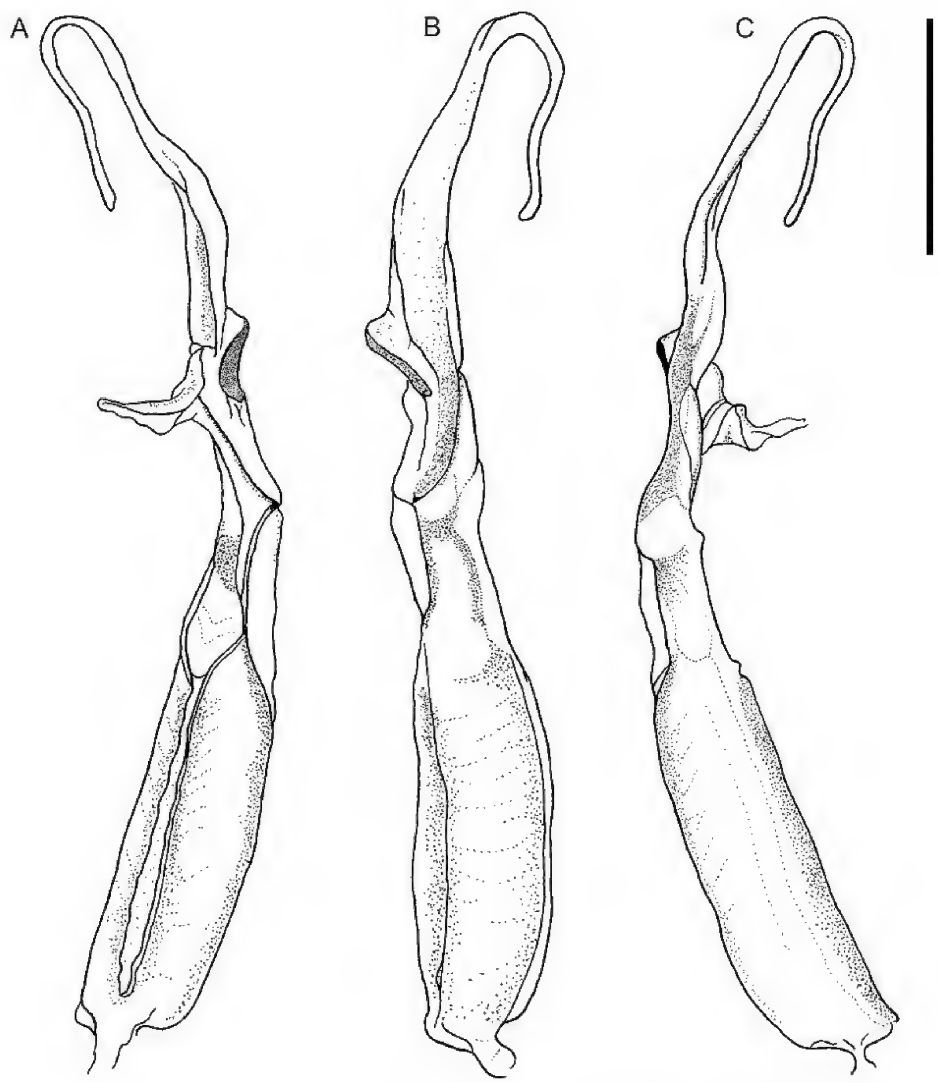

Fig. 61. *Chactopsoides gonzalezspongai*, n. sp., paratype ♂ (AMNH), sinistral hemispermatophore. **A.** Ental aspect. **B.** Dorsal aspect. **C.** Ectal aspect. Scale bar = 1 mm.

paratype ♀ (MAGS 4614), 1 subad. ♂ paratype (MAGS 4706); 1 ♂, 1 ♀ paratypes (USNM), **VENEZUELA: Amazonas:** *Municipio Rio Negro*: Rio Mawarinuma [Baria River], base of tepui La Neblina, 00°55′N 66°10′W, ca. 140 m, 3.vii.1984, 18.ii.1985, P. Anduze, A. Paolillo, C. Brewer Carías, and R. Faitoute.

ADDITIONAL MATERIAL: **VENEZUELA: Amazonas:** *Municipio Rio Negro*: base camp on Río Mawarinuma [Baria River], base of tepui La Neblina, 00°55′N 66°10′W, ca. 140 m, 3.ii–5.iii.1984, R.G. Zweifel, 1 ♀ (AMNH).

DIAGNOSIS: *Chactopsis siapaensis* appears to be most closely related to *C. insignis* and *C. chullachaqui*, n. sp., based on similarities in hemispermatophore morphology (figs. 8, 41, 44): flagellum short and curved; apex with ental fold situated proximally on ental margin; lamina with conspicuous, elongated pedicel, reaching dorsal apophysis; lobe region without additional concave fold; median lobe well developed, densely papillose; dorsal apophysis sclerotized, forming horn-shaped projection, slightly curved api-

cally. The hemispermatophores of *C. amazonica*, *C. barajuri*, and *C. curupira*, n. sp. (figs. 26, 29, 38), differ from those of *C. siapaensis*, *C. chullachaqui*, n. sp., and *C. insignis* as follows (figs. 8, 41, 44): flagellum straight; apex with ental fold situated subproximally; pedicel of lamina short, not reaching dorsal lobe; lobe region with additional concave fold; median lobe mostly apapillose, except with fine papillae distal and dorsally; dorsal lobe forming crest-shaped projection.

Chactopsis siapaensis may be distinguished from *C. chullachaqui*, n. sp., and *C. insignis* as follows (figs. 34, 40, 43): pedipalp chelal *Est* trichobothrium situated closer to V_3 than to Et_1 in *C. siapaensis* and *C. insignis*, but equidistant between V_3 and Et_1 in *C. chullachaqui*, n. sp.; patellar trichobothrium esb_2 situated distal to esb_3 in *C. siapaensis* and *C. insignis*, but situated slightly proximal to esb_3 in *C. chullachaqui*, n. sp.; chela with two porous areas at base of fixed finger, between DMA and DI carinae, and without porous areas at position of DI carina, in *C. siapaensis* and *C. chullachaqui*, n. sp., but with three porous areas between DMA and DI carinae, and two additional porous areas in position of DI carina, in *C. insignis*; pectinal tooth count (♂), 8/8 in *C. siapaensis* and *C. chullachaqui*, n. sp., compared with 9–10/10 in *C. insignis*; telson (♂), lateral and ventral surfaces granular in *C. siapaensis* and *C. chullachaqui*, n. sp., but lateral surfaces mostly smooth, ventral surfaces with few weak granules in *C. insignis*. The three species also differ in hemispermatophore morphology: the lamina is longer than the trunk, with a more slender apex in *C. siapaensis* and *C. chullachaqui*, n. sp., but approximately the same length as the trunk, with a broader apex in *C. insignis*; the dorsal apophysis is less pronounced in *C. siapaensis* than in *C. insignis* and *C. chullachaqui*, n. sp.; the median trough is weakly developed and the median lobe entirely papillose on the ental surface in *C. siapaensis*, whereas the median trough is well developed and the median lobe densely papillose, except along the median trough, in *C. insignis* and *C. chullachaqui*, n. sp.; the median lobe is considerably extended ventrally, with the distal margin less folded toward the ventral surface in *C. siapaensis* and *C. insignis*, but moderately extended, with the distal margin markedly folded toward the ventral surface in *C. chullachaqui*, n. sp.; the pedicel of the lamina is approximately the same length as the ental fold in *C. siapaensis*, but longer than the ental fold in *C. chullachaqui*, n. sp.

SUPPLEMENTARY DESCRIPTION: The following supplements González-Sponga's (1991) original description.

Trichobothria: Femur with three trichobothria (fig. 42A). Patella with 33 trichobothria (fig. 42B–D): two dorsal, seven ventral, 23 external, one internal; trichobothrium v_6 situated slightly closer to v_5 than to v_7; est_5 situated on VE margin, slightly distal to or in same axis as est_4; est_2 situated proximal to est_3 and est_4; em_2 situated slightly distal to em_1 and em_3, em_1 situated in same axis as em_3; esb_2 situated slightly distal to esb_3. Chela with 26 trichobothria (fig. 43): 10 situated on manus, three ventral, seven external (et_2 absent on one female chela; fig. 42C); 16 situated on fixed finger, seven external, six dorsal, three internal (*it*, *isb*, *ib*); *ist* absent; *it* situated in same axis as *est*; *Est* situated closer to V_3 than to Et_1; Et_1 and Et_2 situated approximately in same axis; *eb* situated proximal to base of fixed finger; *db* situated in same axis as *esb*; dm_1 situated in same axis as et_3.

Hemispermatophore: Lamina narrow and elongated (fig. 44A–C); apex slightly wider proximally, curved, and progressively tapering distally; flagellum short, curved; ental margin with short proximal fold; articular flexure present, well developed; pedicel moderately broadened, approximately same length as ental fold. Trunk slightly tortuous medially; sheath-shaped part unknown (probably broken when dissected), ental concavity well developed; foot unknown. Lobe region well developed with two lobes; ental lobe moderately developed, sclerotized, forming projection toward ental surface; median lobe well developed, extending ventrally, ventral and ental surfaces densely papillose, distal margin moderately folded, median trough weakly developed; dorsal apophysis strongly sclerotized, forming horn-shaped projection, slightly curved apically.

REMARKS: The sex of the holotype (♂) was misidentified in the original description as ♀.

DISTRIBUTION: This species is known only from the state of Amazonas, Venezuela, near the border with Brazil (fig. 1).

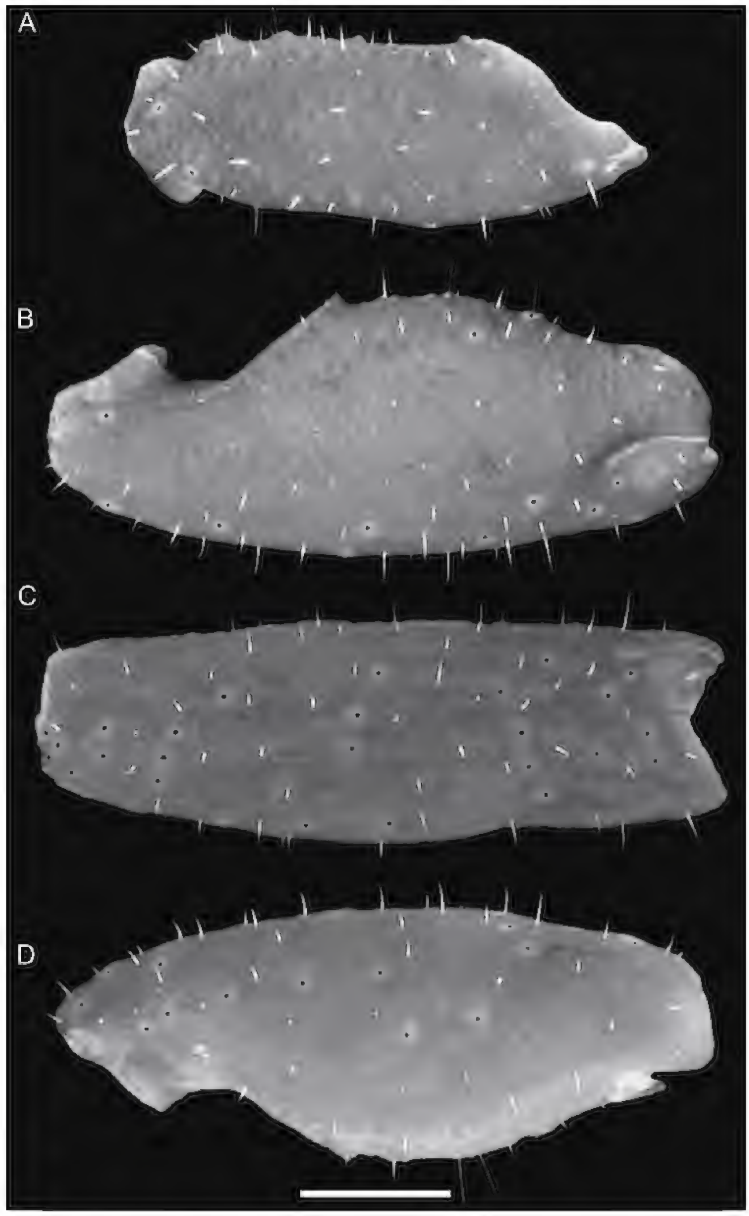

Fig. 62. *Chactopsoides marahuacaensis* (González-Sponga, 2004), n. comb., holotype ♀ (MAGS), dextral pedipalp segments. **A.** Femur. **B–D.** Patella. **A, B.** Dorsal aspect. **C.** External aspect. **D.** Ventral aspect. Scale bar = 1 mm.

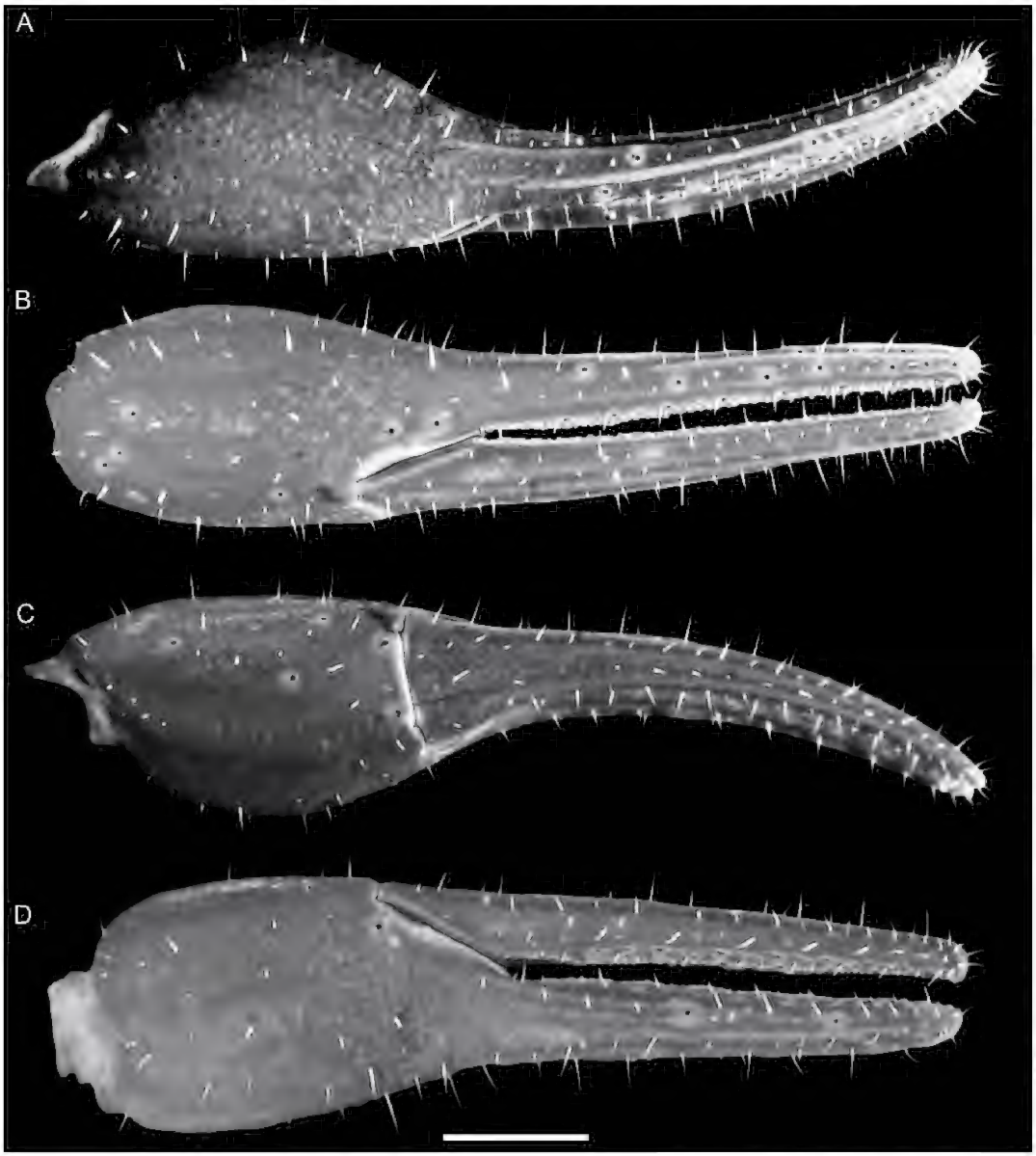

Fig. 63. *Chactopsoides marahuacaensis* (González-Sponga, 2004), n. comb., holotype ♀ (MAGS), dextral pedipalp chela. **A.** Dorsal aspect. **B.** External aspect. **C.** Ventral aspect. **D.** Internal aspect. Scale bars = 1 mm.

HABITAT: The known locality of this species falls within primary rainforest at the base of tepui La Neblina.

Chactopsis sujirima González-Sponga, 1982
Figures 1, 12B, 17B, 23E

Chactopsis sujirima González-Sponga, 1982: 132–137, figs. 6–10; Lourenço, 1986a: 564, fig. 23, table II; 1986b: 165, fig. 5; Lourenço and Francke, 1986: 552; González-Sponga, 1991: 27, 32, 58, 59, map 1; Lourenço, 1994a: 182; González-Sponga, 1996: 111, 113, figs. 248–251; Sissom, 2000: 312; Soleglad and Sissom, 2001: 92; González-Sponga, 2001: 29, 41, 49, map 5; Lourenço, 2002b: 435; Rojas-Runjaic and de Sousa, 2007: 299; Botero-Trujillo, 2008: 34.

Chactopsis sp.: González-Sponga, 1984a: 53 (part).

TYPE MATERIAL: Holotype ♀ (MAGS 4390 ex MCNC 796), **VENEZUELA: Amazonas:** *Municipio Atabapo*: Coshirowäteri, confluence of Matacuni and Padamo rivers [03°02′14″N 65°13′41″W], x.1982, P. Anduze.

NEW RECORD: **BRAZIL: Amazonas:** *Municipio Barcelos*: Serra do Tapirapecó [01°17′N 64°39′W, 1200 m], A.A. Nogueira, 16.x.2007, 1 ♀ (INPA 0550), tissue (AMNH [LP 9892]).

DIAGNOSIS: Although the male of *C. sujirima* is unknown, it is placed in the genus *Chactopsis* on the basis of its trichobothrial pattern. *Chactopsis sujirima* differs from all other species of the genus in possessing 31 trichobothria on the pedipalp patella, due to the absence of trichobothria v_6 and v_7; all other species of the genus possess 33 or 34 trichobothria, including v_6 and v_7, on the patella. In addition, the DL carinae of the tergites, which progressively increase in size from tergites I–VII, are more developed in *C. sujirima* (fig. 12B) than in other species of the genus, in which the DL carinae are well developed only on tergite VII, and vestigial on tergites I–VI (fig. 12A); the DL carinae of metasomal segments I–IV are also more developed, becoming very pronounced posteriorly in *C. sujirima* (fig. 17B), than in all other species of the genus (fig. 17A); and the VL carinae are well developed and granular in the anterior two-thirds of the telson in *C. sujirima* (fig. 23E), unlike other species of the genus, in which the VL carinae are absent or obsolete (fig. 23A–D).

SUPPLEMENTARY DESCRIPTION: The following supplements González-Sponga's (1982) original description.

Trichobothria: Femur with three trichobothria. Patella with 31 trichobothria: two dorsal, five ventral, 23 external, one internal; trichobothria v_6 and v_7 absent; est_5 situated on VE margin, slightly distal to est_4; est_2 situated proximal to est_3 and in same axis as est_4; em_2 situated slightly proximal to em_1 and em_3; em_1 situated in same axis as em_3; esb_2 situated slightly distal to esb_3. Chela with 26 trichobothria: 10 situated on manus, three ventral, seven external; 16 situated on fixed finger, seven external, six dorsal, three internal (*it*, *isb*, *ib*); *ist* absent; *it* situated in same axis as *est*; *Est* situated closer to V_3 than to Et_1; Et_1 and Et_2 situated approximately in same axis; *eb* situated proximal to base of fixed finger; *db* situated slightly proximal to *esb*; dm_1 situated slightly proximal to et_3.

DISTRIBUTION: This species is known only from the type locality in the state of Amazonas, Venezuela, and a new record from Serra do Tapirapecó, a mountainous region in the state of Amazonas, Brazil (fig. 1).

HABITAT: The two known localities of this species fall within primary rainforest and montane forest.

Chactopsoides, n. gen.

TYPE SPECIES: *Chactopsis anduzei* González-Sponga, 1982 [= *Chactopsoides anduzei* (González-Sponga, 1982), n. comb.].

ETYMOLOGY: The generic name reflects the similarity and close phylogenetic relationship with *Chactopsis*, and is masculine in gender.

DIAGNOSIS: *Chactopsoides*, n. gen., is most closely related to *Chactopsis*, from which it may be separated as follows. Pedipalp chelal trichobothrium *ist* is present and *isb* absent, *it* is situated between et_3 and *est*, Et_2 is situated distal to Et_1, and dm_1 is situated distal to et_3, in *Chactopsoides*, n. gen. (figs. 56, 60, 63), whereas *ist* is absent and *isb* present, *it* is situated between *est* and *em*, Et_1 and Et_2 are situated in the same axis, and dm_1 is situated proximal to or in the same axis as et_3, in *Chactopsis* (figs. 25, 28, 31, 34, 37, 40, 43). The hemispermatophore lamina is short and narrow in *Chactopsoides*, n. gen. (figs. 57, 61), but long and broad in *Chactopsis* (fig. 8). The hemispermatophore flagellum is slightly undulated (never curved) and the ental fold absent in *Chactopsoides*, n. gen., whereas the flagellum is curved or straight, and the ental fold present and distinct along the ental margin, noticeably toward the dorsal surface, in *Chactopsis*. The hemispermatophore trunk is elongated, the sheath-shaped portion extends more than two-thirds the length of the trunk, the foot extends almost the entire length of the trunk, the median longitudinal sulcus is present, and the ventral concavity reduced in *Chactopsoides*, n. gen., whereas the trunk is moderately or strongly tortuous medially, the sheath-shaped portion and the

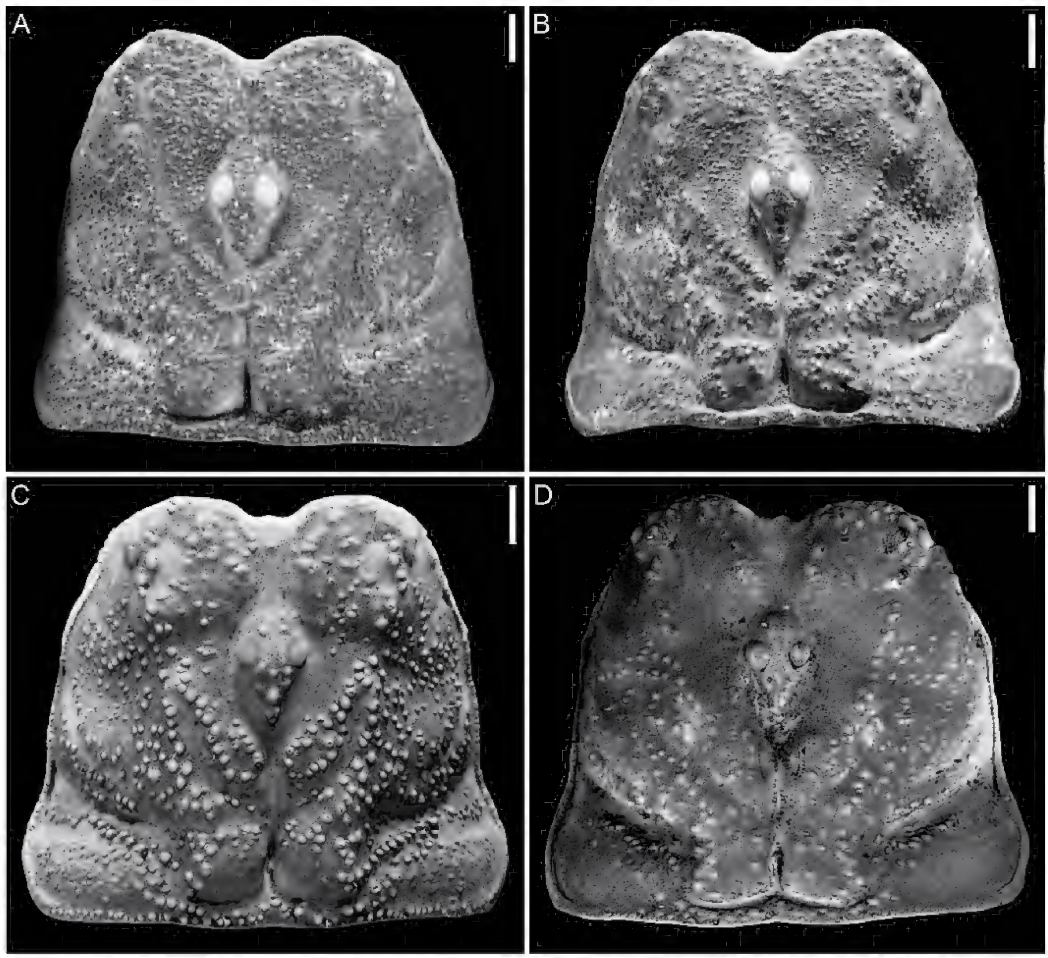

Fig. 64. *Megachactops*, n. gen., carapace, dorsal aspect. **A, B.** *Megachactops coriaceo* (González-Sponga, 1991), n. comb. **A.** Holotype ♂ (MAGS). **B.** Paratype ♀ (MAGS). **C, D.** *Megachactops kuemoi*, n. sp. **C.** Holotype ♂ (MHNLS). **D.** Paratype ♀ (AMNH). Scale bars = 1 mm.

foot extend half or less than half the length of the trunk, the median longitudinal sulcus is absent, and the ventral concavity well developed in *Chactopsis*. The lobe region of the hemispermatophore is reduced, with a single, comparably short and weakly developed median lobe; the ental lobe absent, and the dorsal apophysis well developed, but laminar or folded in *Chactopsoides*, n. gen.; by contrast, the lobe region is well developed, with two lobes, the ental lobe is slightly sclerotized, forming a projection toward the ental surface, the median lobe is well developed, and the dorsal apophysis forms a sclerotized, crest- or horn-shaped projection in *Chactopsis*. The hemispermatophore of *C. marahuacaensis*, n. comb., and *C. yanomami,* n. comb., are unknown, but this species is included in *Chactopsoides*, n. gen., based on its pedipalp trichobothrial pattern.

Chactopsoides, n. gen., may be separated from *Megachactops*, n. gen., as follows. The carapace is acarinate and its anterior margin possesses a moderate to shallow median notch in *Chactopsoides*, n. gen. (fig. 45), whereas the carapace exhibits distinct median carinae, and its anterior margin possesses a conspicuous median notch, in *Megachactops*, n. gen. (fig. 64). The pedipalp patellar DM carinae are absent and the DPP present but weakly developed in *Chactopsoides*, n. gen. (fig. 55B), whereas the DM carinae are

present and the DPP prominent in *Megachactops*, n. gen. (fig. 74B). Pedipalp patellar trichobothria v_6 and v_7 are situated submedially and out of alignment with v_1–v_5, which are situated close to the VE carina, in *Chactopsoides*, n. gen. (fig. 55D), whereas v_6 and v_7 are aligned with v_1–v_5 and situated close to the VE carina in *Megachactops*, n. gen. (fig. 74D). Pedipalp chela trichobothrium *db* is situated in the proximal third of the fixed finger, and V_3 is situated medially on the manus, equidistant between V_1 and V_4, in *Chactopsoides*, n. gen. (figs. 56, 60, 63), whereas *db* is situated medially on the fixed finger, and V_3 is situated in the distal third of the manus, closer to V_1 than to V_4 in *Megachactops*, n. gen. (figs. 71, 75). The VSM carinae of metasomal segment IV are complete and the VM carina absent in *Chactopsoides*, n. gen. (fig. 47), whereas the VSM carinae are partial and the VM carina present medially (well developed or vestigial) in *Megachactops*, n. gen. (figs. 66, 68). The ML carinae of metasomal segment V occupy more than half the length of the segment in *Chactopsoides*, n. gen. (fig. 51), but less than half its length in *Megachactops*, n. gen. (fig. 68). The hemispermatophore of the two genera differs as follows. The apex is elongated, the lobe region reduced to one-fifth of the hemispermatophore length, with a single median lobe, usually papillose, the ental lobe absent, and the dorsal apophysis present, in *Chactopsoides*, n. gen. (figs. 57, 61), whereas the apex is short and subtriangular, the lobe region well developed, occupying a third of the hemispermatophore length, with two lobes, the dorsal apophysis absent, the ental lobe elongated, and the median lobe auriculate and almost apapillose, in *Megachactops*, n. gen. (figs. 72, 76).

DESCRIPTION: The following general description outlines characters common to all species of *Chactopsoides*, n. gen.

Total length: Small scorpions, ranging in total length from 21–35.5 mm.

Coloration: Varies from yellowish to brownish with dark spots.

Chelicerae: Manus, dorsoexternal surfaces sparsely setose; ventral and internal surfaces densely setose. Fixed finger, dorsal margin with four teeth (distal, subdistal, median, and basal), median and basal teeth fused into a bicusp. Movable finger, dorsal margin with five teeth (distal, two subdistal, median, and basal); ventral margin with two teeth (distal, subdistal); dorsal distal tooth smaller than ventral distal tooth; ventral surface with long, well-developed serrula.

Carapace: Anterior margin with moderate to shallow median notch (fig. 45). Posterior margin sublinear, usually with shallow median notch. Surfaces mostly granular, especially in ♂, more so on anterior third, ♀ less granular, mostly smooth, nongranular surfaces punctate; often with scattered microsetae; carinae absent or obsolete. Ocular tubercle well developed, slightly anteromedial; median ocelli well developed. Four pairs of lateral ocelli; anterolateral and median lateral pairs similar in size, approximately half the size of median ocelli; posterolateral pair smaller, approximately one-quarter the size of anterolateral and median lateral ocelli; dorsomedian pair greatly reduced, approximately one-quarter the size of posterolateral ocelli. Anteromedian longitudinal sulcus broad, well developed; postocular sulcus deep; posteromedian longitudinal and posterolateral sulci well developed; posterior transverse sulcus shallow.

Pedipalps: Patella, DM carina absent. Chela manus narrow and cylindrical, slightly more incrassate in ♀, with elongated fingers; nine carinae (D, SD, DS, DMA, DI, E, IM, VE, and VI) obsolete, usually identified by punctation, fine granulation, subtle differences in angles between adjacent surfaces, and/or pigmentation. Fixed finger carinae moderately developed, costate; two porous areas usually present proximally, in place of DI carina; dentition complex, median denticle row continuous, complete, flanked by 8 or 9 internal and external denticles in distal two-thirds, and numerous accessory denticles arranged in two to three rows, including at least one continuous row of external accessory denticles and at least one discontinuous row of internal accessory denticles.

Trichobothria: Femur with three trichobothria (figs. 55A, 59A, 62A): one external (*e*), one dorsal (*d*), one internal (*i*). Patella with 33 trichobothria (figs. 55B–D, 59B–D, 62B–D): two dorsal (d_1, d_2); seven ventral (v_1–v_7), v_1–v_5 situated close to VE carina, v_6 and v_7 situated submedially and out of alignment with v_1–v_5;

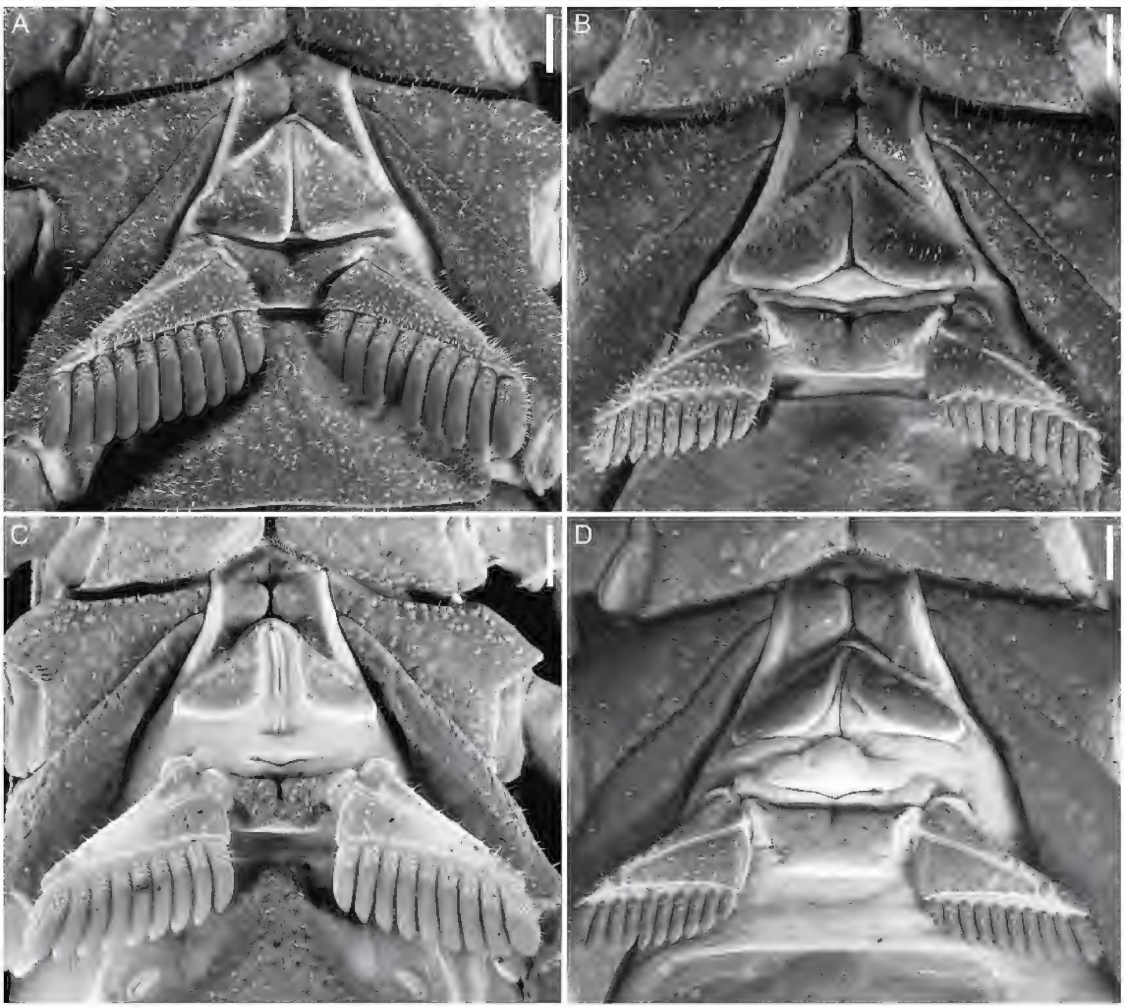

Fig. 65. *Megachactops*, n. gen., sternum and pectines, ventral aspect. **A, B.** *Megachactops coriaceo* (González-Sponga, 1991), n. comb. **A.** Holotype ♂ (MAGS). **B.** Paratype ♀ (MAGS). **C, D.** *Megachactops kuemoi*, n. sp. **C.** Holotype ♂ (MHNLS). **D.** Paratype ♀ (AMNH). Scale bars = 1 mm.

23 external (et_1–et_5, est_1–est_5, em_1–em_3, esb_1–esb_4, eb_1–eb_6); one internal (*i*). Chela with 26 trichobothria (figs. 56, 60, 63): 10 situated on manus, three ventral (V_1, V_3, V_4), seven external (Et_1–Et_3, *Est*, *Esb*, Eb_1, Eb_2); 16 situated on fixed finger, seven external (et_1–et_3, *est*, *em*, *esb*, *eb*), six dorsal (*dt*, *dst*, dm_1, dm_2, *dsb*, *db*), three internal (*it*, *ist*, *ib*).

Legs: Prolateral surfaces usually granular, retrolateral surfaces smooth. Tibial spurs absent. Pro- and retrolateral pedal spurs present. Basitarsi setose, each with dorsal and ventral rows of small brushlike spinules. Telotarsi setose, each with ventromedian row of elongated spinules, flanked by two paired rows of setae (pro- and retroventral and pro- and retrolateral); ungues well developed, curved, equal in length.

Sternum: Shape subpentagonal with two lateral lobes, and lateral margins converging anteriorly; posterior width greater than length; posterior depression deep (fig. 46).

Pectines: Pectinal plate, anterior margin with conspicuous median notch, lateral margins subparallel (♀) or converging posteriorly (♂). Pectines each comprising four lamellae, proximal and marginal lamellae larger, subdistal and distal lamellae smaller; proximal lamella usually fused with subdistal lamella; fulcra absent. Tooth count, 7–11 (fig. 46).

Sternites: Sternites III–VI each with pair of small, oval spiracles, situated mediolaterally; surfaces usually smooth and punctate; VII with VL carinae obsolete.

Metasoma: Metasomal segments I–V (figs. 47–51), intercarinal surfaces densely granular, nongranular surfaces punctate; DL, ML, VL, VSM, and VM carinae distinct; DSM and LSM carinae absent or obsolete, LSM carinae often vestigial; DSM carinae usually present on segments I and II; DSM and DL carinae converging distally on segments I–III, subparallel on IV; DL and VL carinae complete on all segments; ML carinae complete on segments I–IV, variably developed on V; LIM carinae less developed, complete only on segment I; porous areas, usually forming raised mounds, present posteriorly in place of LIM carinae on segments II–IV; VSM carinae usually present on segments II–IV; VM carina variably developed on segment V.

Telson: Vesicle slightly elongated. Aculeus short, gently curved (fig. 52).

Hemispermatophore: Lamina narrow, slender, weakly sclerotized, especially distally (figs. 57, 61); apex elongated, curved, progressively tapering distally, and terminating in flagellum; frontal and distal crests absent; flagellum slightly undulated; ental fold absent; articular flexure present; slight proximal constriction forming moderately elongated pedicel. Trunk well developed, elongated; proximal part forming sheath-shaped base, well developed, with median longitudinal sulcus; distal part of ventral surface concave, reduced; foot well developed, extending almost entire length of trunk. Lobe region (capsule) complex, reduced, with single median lobe (figs. 57, 61); ental lobe absent; median lobe moderately developed, forming internobasal reflexion of sperm duct, sometimes with conspicuous median trough; dorsal apophysis well developed, laminar.

Included Taxa: Four species: *Chactopsoides anduzei* (González-Sponga, 1982), n. comb.; *Chactopsoides gonzalezspongai*, n. sp.; *Chactopsoides marahuacaensis* (González-Sponga, 2004), n. comb.; *Chactopsoides yanomami* (Lourenço et al., 2011), n. comb.

Distribution: The known records of *Chactopsoides*, n. gen., fall within the state of Amazonas, Brazil, the state of Amazonas, Venezuela, and the department of Vichada, Colombia (fig. 2).

Habitat: The known species of *Chactopsoides*, n. gen., inhabit primary tropical rainforest in the basins of the Orinoco and Rio Negro rivers (fig. 4).

Chactopsoides anduzei (González-Sponga, 1982), n. comb.

Figures 2, 4A, 5C, 9C, 45A, B, 46A, B, 47, 50A, B, 51A, 52A, B, 53–57; table 5

Chactopsis anduzei González-Sponga, 1982: 128–132, figs. 1–5; Lourenço, 1986a: 564, fig. 23; 1986b: 165, fig. 5; Lourenço and Francke, 1986: 550, 552, map 1 (part); González-Sponga, 1991: 27, 32, 58, 59, map 1; 1996: 111, 112, figs. 244–247; Lourenço and Pinto-da-Rocha, 2000: 264 (part); Sissom, 2000: 311; Soleglad and Sissom, 2001: 92; González-Sponga, 2001: 29, 41, 49, map 5; Lourenço, 2002a: 220, 222 (part); 2002b: 429, 435 (part); 2002c: 139; Rojas-Runjaic and de Sousa, 2007: 299; Botero-Trujillo, 2008: 34 (part);

Chactopsis sp.: González-Sponga, 1984a: 53 (part).

Chactopsis carolinae Botero-Trujillo, 2008: 36–41, figs. 1–14, table 1 (new synonym).

Type Material: *Chactopsis anduzei*: Holotype ♀ (MAGS 4392 ex MCNC 794), paratype ♀ (MAGS 4393 ex MCNC 795), 4 ♀ paratypes (MAGS 4407, 4408, 4409, 4410), **VENEZUELA: Amazonas:** *Municipio Atures*: Caño Pava, between El Danto and Gavilán villages [ca. 05°32′N 67°24′W], 200 m, x.1982, P. Anduze. *Chactopsis carolinae*: Holotype ♂ (IAvH-E 100759), **COLOMBIA: Vichada Department:** Selva de Matavén, Bosque de Planicies Arenosas, 04°29′13″N 68°00′22″W, 260 m, pitfall trap, 31.iii–2.iv.2007, L.E. Franco; paratype ♀ (IAvH-E 100760), Selva de Matavén, Cumaribo, Bosque de Cerro Rocoso, 04°36′33″N 67°51′52″W, 300 m, Winkler trap, 6–8.iii. 2007, L.E. Franco; 1 juv. ♀ paratype (IAvH-E 100761), Selva de Matavén, Cumaribo, Bosque de Tierra Firme, 04°33′32″N 68°11′51″W, 270 m, pitfall trap, 22–24.iii.2007, L.E. Franco.

New Records: **VENEZUELA: Amazonas:** *Municipio Atures*: between Gavilán and Las Pavas, 05°32′18.48″N 67°24′40.56″W, 89 m, 11.x.2008, S. Bazó, rainforest, 1 ♂, 1 ♀ (AMNH), 1 ♀ (AMNH [LP 9239]); near Puerto Ayacucho, road to Tobogán de la Selva, 05°36′42.72″N 67°35′43.03″W, 76 m,

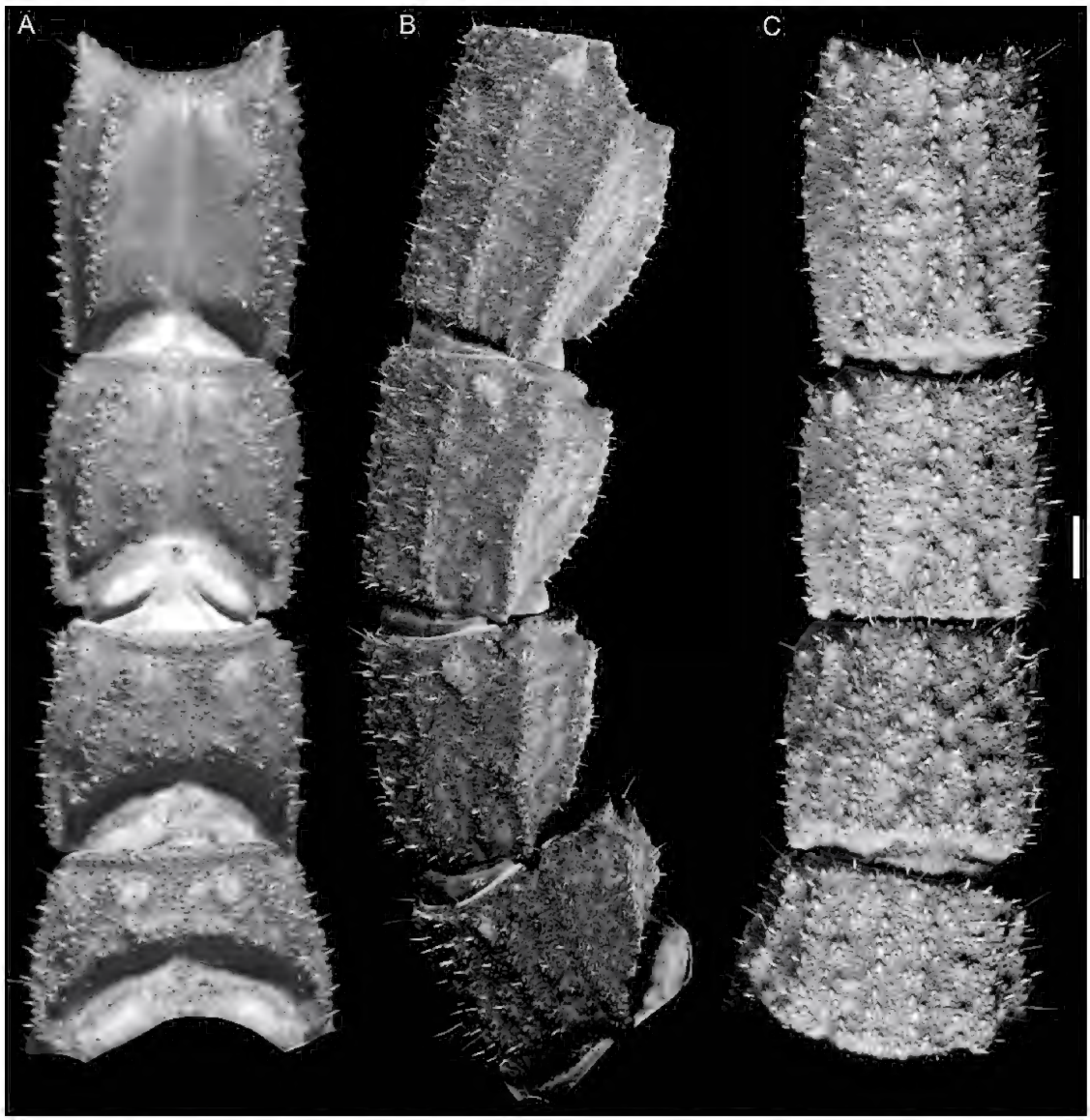

Fig. 66. *Megachactops coriaceo* (González-Sponga, 1991), n. comb., holotype ♂ (MAGS), metasomal segments I–IV. **A.** Dorsal aspect. **B.** Lateral aspect. **C.** Ventral aspect. Scale bar = 1 mm.

15.viii.2009, F. Rojas-Runjaic and J.A. Ochoa, secondary forest, 1 ♂, 1 ♀ (AMNH), 1 juv. (AMNH [LP 10089]), 1 ♂, 1 ♀, 1 juv. (MHNLS); near Puerto Ayacucho, 05°38.760′N 67°34.778′W, 85–100 m, 10.x.2008, S. Bazó, rainforest, 1 ♀ (AMNH [LP 9215]), 1 ♀ (MHNC); Tobogán de la Selva [ca. 05°36′42.72″N 67°35′43.03″W, 76 m], xii.2002, A. Pérez and G. Giupponi, 2 ♀ (MNRJ 7558). *Municipio Autana*: Isla Ratón, Orinoco River, 05°03′52.92″N 67°49′00″W, 81 m, 7.viii.2009, F. Rojas-Runjaic, A. Ferrer and J.A. Ochoa, secondary forest, 3 ♂, 1 ♀, 1 juv. (AMNH), 2 juv. (AMNH [LP 10086, 10087]), 5 ♂, 4 ♀, 4 juv. (MHNLS), 1 ♂, 1 ♀, 1 juv. (MHNC); Tobogán del Cuao, 05°05′58″N 67°29′54″W, 124 m, 14–15.vii.2010, F. Rojas-Runjaic, 8 ♀, 1 juv. (MHNLS).

DIAGNOSIS: *Chactopsoides anduzei*, n. comb., differs from *C. gonzalezspongai*, n.

sp., and *C. marahuacaensis*, n. comb., as follows. The carapace is coarsely to finely granular, especially anteriorly and laterally (more so in ♂), in *C. anduzei*, n. comb., and *C. gonzalezspongai*, n. sp. (fig. 45A–D), but mostly smooth, with scattered granules near anterior margin only, and nongranular surfaces punctate, in *C. marahuacaensis*, n. comb. (fig. 45E). The metasomal LIM carinae are restricted to the anterior third of segments II and III in *C. anduzei*, n. comb. (fig. 47), and absent, represented by only a few granules posteriorly, in *C. gonzalezspongai*, n. sp., and *C. marahuacaensis*, n. comb. (fig. 48A, B). The metasomal VSM carinae are complete and granular on segments II–IV in *C. anduzei*, n. comb., and *C. gonzalezspongai*, n. sp., whereas the VSM carinae are obsolete on segment II, and complete and granular on segments III and IV in *C. marahuacaensis*, n. comb. The DMA carina of the pedipalp chela is costate on the fixed finger only in *C. anduzei*, n. comb., and *C. marahuacaensis*, n. comb., but costate on the distal quarter of the manus and on the fixed finger in *C. gonzalezspongai*, n. sp. Chelal trichobothrium *db* is situated slightly proximal to *esb* in *C. anduzei*, n. comb., equidistant between *esb* and *eb* in *C. gonzalezspongai*, n. sp., and closer to *eb* in *C. marahuacaensis*, n. comb. The dimensions of metasomal segment V and telson provide additional differences between *C. anduzei*, n. comb., *C. gonzalezspongai*, n. sp., and *C. marahuacaensis*, n. comb. The length/width ratio of metasomal segment V is 1.83–2.10 (♂) and 1.75–1.96 (♀) in *C. anduzei*, n. comb., 1.63–1.90 (♂), 1.63–1.72 (♀) in *C. gonzalezspongai*, n. sp., and 1.77–1.82 (♀) in *C. marahuacaensis*, n. comb. The telson length/height ratio is 3.22–3.75 (♂) and 3.40–3.85 (♀) in *C. anduzei*, n. comb., 2.72–3.28 (♂) and 2.63–3.13 (♀) in *C. gonzalezspongai*, n. sp., and 3.13–3.15 (♀) in *C. marahuacaensis*, n. comb. *Chactopsoides anduzei*, n. comb., may be further distinguished from *C. gonzalezspongai*, n. sp., by the hemispermatophore morphology (figs. 57, 61): the lamina is 15%–20% shorter than the trunk in *C. anduzei*, n. comb., but approximately the same length in *C. gonzalezspongai*, n. sp.; the median lobe and dorsal apophysis are more developed in *C. anduzei*, n. comb., than *C. gonzalezspongai*, n. sp. (figs. 54, 57); the sheath-shaped part occupies 80% of the trunk in *C. anduzei*, n. comb., compared with two-thirds of the trunk in *C. gonzalezspongai*, n. sp. (figs. 54, 57). There are also some differences in pigmentation pattern and dimensions of the pedipalp chela between the two species: the pedipalp chela manus length/width ratio is 4.43–4.82 (♂) and 4.21–4.67 (♀) in *C. anduzei*, n. comb., compared with 4.00–4.58 (♂) and 3.82–4.15 (♀) in *C. gonzalezspongai*, n. sp.; metasomal segments II–IV each exhibit two complete stripes of pigmentation (VL only), the VM stripe restricted to the anterior half of each segment, in *C. anduzei*, n. comb., compared with three complete stripes of pigmentation (single VM and paired VL), the VM stripe being complete, in *C. gonzalezspongai*, n. sp.

REDESCRIPTION: Based on the holotype ♀, paratypes, and additional adult ♂ and ♀ specimens listed in the Material Examined. Measurements of the holotype ♂ and a paratype ♀ recorded in table 5.

Total length: ♂, 22.6–30.5 mm (n = 10; mean = 27.77 mm); ♀, 25.8–35.52 mm (n = 14; mean = 31.69 mm).

Color: Base color chestnut to chestnut yellow (adults; fig. 5C) or yellow (juveniles), with metasomal segment V and telson darker than preceding segments; carapace, tergites, sternite VII, metasoma, legs, and pedipalps with dark brown spots; sternites III–VI and coxosternal region yellow; pectines white; aculeus brown. Cheliceral manus, dorsal surfaces with fine reticulate pigmentation, becoming contiguous distally near base of fixed finger; fixed and movable fingers entirely pigmented. Carapace, median ocular tubercle, and surfaces around lateral ocelli very densely pigmented; lateral surfaces densely pigmented; anteromedian longitudinal sulcus moderately to densely pigmented; unpigmented median longitudinal stripe, extending from anterior to posterior margins and including posteromedian longitudinal and postocular sulci, usually present and broad, narrow or faint. Pedipalp femur, dorsal surface densely pigmented with small, unpigmented areas in proximal half, other intercarinal surfaces faintly pigmented, with pigmentation stripes along DI, DE, and EM carinae, and faint pigmentation stripe along

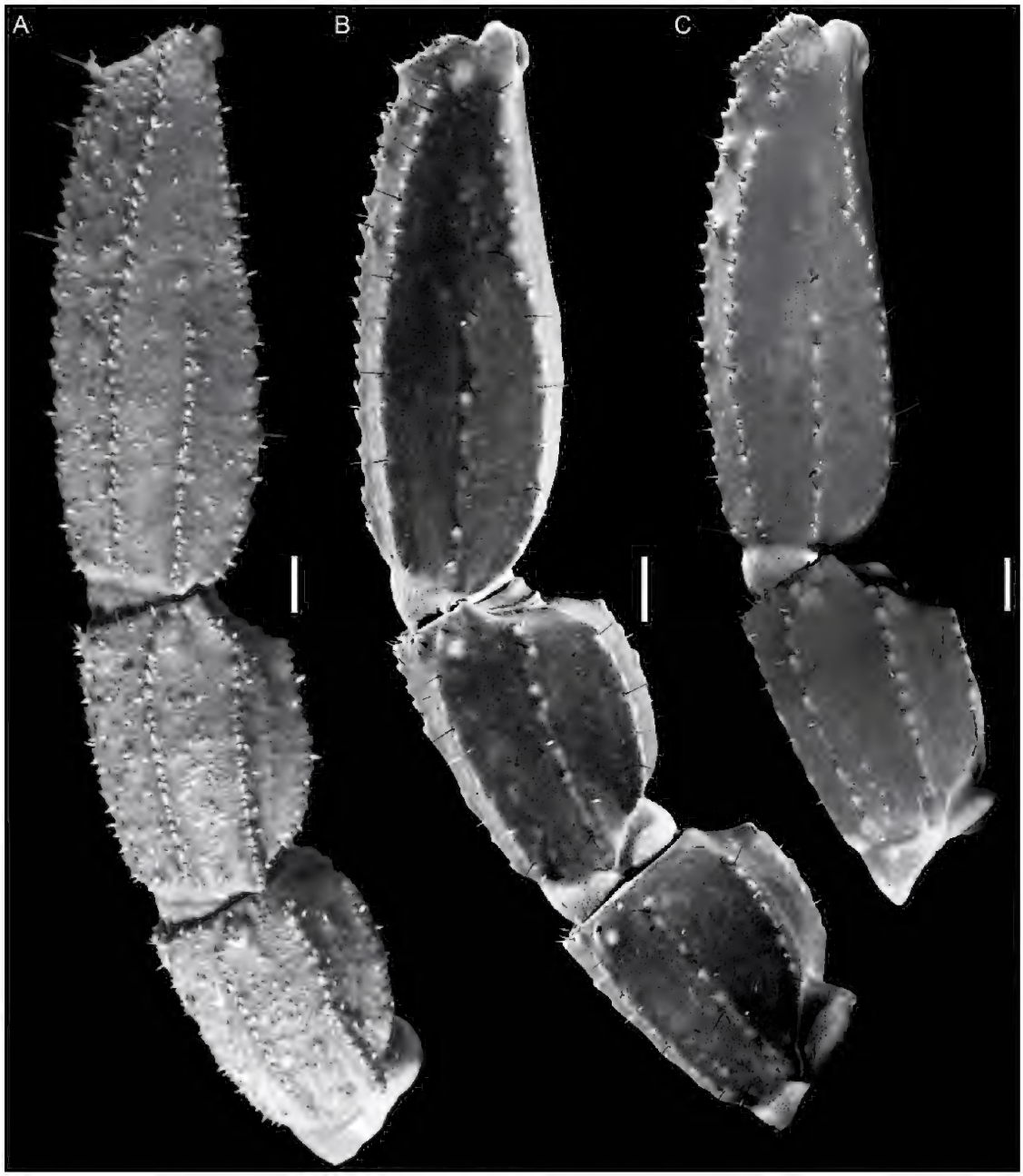

Fig. 67. *Megachactops*, n. gen., metasomal segments III–V (**A, B**) or IV and V (**C**), lateral aspect. **A.** *Megachactops coriaceo* (González-Sponga, 1991), n. comb., paratype ♀ (MAGS). **B, C.** *Megachactops kuemoi*, n. sp. **B.** Holotype ♂ (MHNLS). **C.** Paratype ♀ (AMNH). Scale bars = 1 mm.

VI carina; patella, dorsal and internal surfaces densely pigmented with irregular pigmentation stripes along DE and DI carinae, external surface with pigmentation stripe along EM carina and reticulate pigmentation throughout, ventral surface with pigmentation stripes along VI and VE carinae and faint reticulate pigmentation; chela densely

pigmented, dorsal and external surfaces with fine reticulation, pigmentation stripes along D, SD, DS, DMA, DI, E, IM, VI and VE carinae, contiguous at base of fingers, VI and VE pigmentation stripes often faint or absent. Leg femur, prolateral surfaces faintly pigmented; patella and tibia, pro- and retrolateral surfaces faintly pigmented. Tergites I–VI densely pigmented except for small, unpigmented area medially, usually forming narrow or broad (especially in juveniles) median stripe longitudinally across tergites; VII similar, but unpigmented area broader, comprising surface between submedian carinae. Coxosternal region, genital operculum and pectines mostly unpigmented. Sternites III–VI, mostly unpigmented, except for faint spots on lateral margins; VII with two broad, dark pigmentation stripes sublaterally and faint pigmentation submedially. Metasomal segments I–IV, dorsal surfaces each with pigmentation stripes along DSM and DL carinae, surfaces between DSM carinae faintly pigmented; lateral surfaces each with pigmentation stripes along ML carinae and reticulate pigmentation along LIM and LSM carinae, surfaces between DL and ML carinae densely pigmented in posterior third of segment, surfaces between ML and VL carinae densely pigmented in posterior two-thirds; ventral surfaces each with paired pigmentation stripes along VL carinae, surfaces between VL and VSM carinae densely pigmented in posterior half of segment, fine reticulate pigmentation along VSM carinae connecting VL pigmentation stripes with VM pigmentation. Metasomal segment V, dorsal surface faintly pigmented, with paired stripes of DSM pigmentation contiguous posteriorly with paired stripes of pigmentation along DL carinae; lateral surface with reticulate pigmentation along LIM and LSM carinae, and pigmentation stripes along ML carinae, contiguous with DL pigmentation posteriorly, surfaces between ML and VL carinae densely pigmented in posterior half of segment; ventral surface with three dense pigmentation stripes along VM and paired VL carinae, contiguous in posterior third of segment, and with fine pigmentation stripes along VSM carinae in anterior third, surfaces between VL and VSM carinae densely pigmented in posterior two-thirds. Telson vesicle, dorsolateral margins with faint pigmentation in anterior half of segment; ventral surface with two broad VL and one narrow VM pigmentation stripes, separated by two narrow, unpigmented stripes.

Chelicerae: Movable finger with well-developed serrula, occupying approximately half its length; ventral subdistal tooth present.

Carapace: Anterior margin with shallow, biconcave median notch and several microsetae (fig. 45A, B); posterior margin sublinear, with few microsetae. Interocular, circumocular, anterolateral, and median lateral surfaces with variable fine and medium granulation, becoming more finely granular posterolaterally, granulation more pronounced in ♂ (fig. 45A, B); nongranular surfaces punctate, more so in ♀; scattered microsetae throughout. Anteromedian and posteromedian carinae obsolete, obscured by granulation. Median ocelli half an ocular diameter apart. Anteromedian longitudinal sulcus finely granular, nongranular surfaces punctate; posteromedian longitudinal sulcus sparsely granular; other sulci smooth.

Pedipalps: Femur, length/width ratio, ♂, 2.80–3.44 (n = 12; mean = 3.09); ♀, 2.83–3.26 (n = 18, mean = 3.05); DE, DI, and VI carinae complete, granular (fig. 55A), DE carina weakly developed in ♀; EM carina reduced to punctation in distal third of segment, slightly granular; VM carina weakly granular, restricted to proximal quarter of segment; other carinae absent; dorsal intercarinal surface finely granular (♂) or slightly punctate (♀), and with few coarse granules medially; external intercarinal surface smooth and slightly punctate; ventral intercarinal surface punctate, smooth (♀) or finely granular proximally (♂); internal intercarinal surface finely granular (♂) or punctate (♀). Patella, length/width ratio, ♂, 2.63–3.05 (n = 12; mean = 2.82); ♀, 2.55–2.79 (n = 18, mean = 2.69); DE, DI, and VI carinae complete, granular, DE slightly less developed (fig. 55B–D); EM and VE carinae obsolete, reduced to punctation, more evident in ♂; DPP comprising moderate proximal granule and additional smaller granules, VPP reduced to one or two smaller granules; dorsal intercarinal surface densely granular, more so in ♂, nongranular surfaces punctate, more so in ♀; external intercarinal surfaces

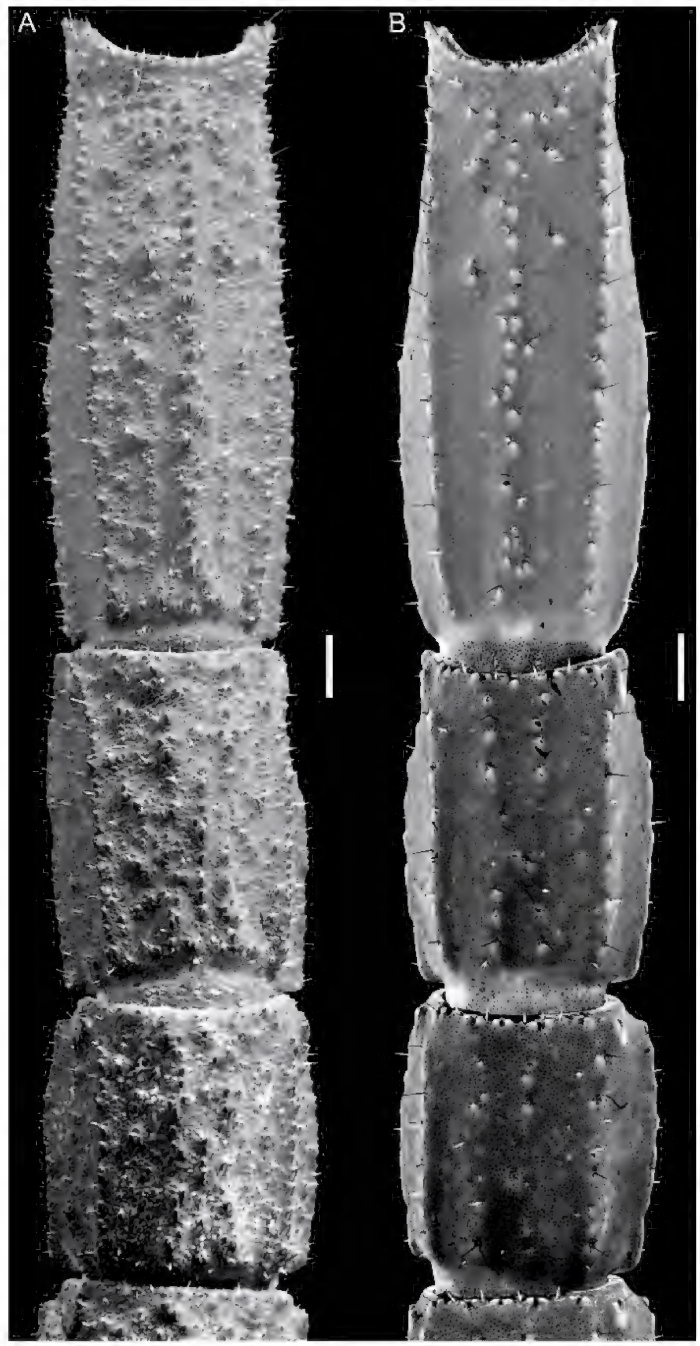

Fig. 68. *Megachactops*, n. gen., metasomal segments III–V, ventral aspect. **A.** *Megachactops coriaceo* (González-Sponga, 1991), n. comb., paratype ♀ (MAGS). **B.** *Megachactops kuemoi*, n. sp., holotype ♂ (MHNLS). Scale bars = 1 mm.

punctate, more so in ♂; ventral intercarinal surfaces smooth, slightly punctate in ♂; internal intercarinal surface densely granular. Chela manus narrow, fingers elongated (fig. 56); chela length/width ratio, ♂, 4.43–4.82 (n = 12; mean = 4.59); ♀, 4.21–4.67 (n = 18, mean = 4.41); length/height ratio, ♂, 4.38–4.82 (n = 12; mean = 4.60); ♀, 4.30–4.67 (n = 18, mean = 4.43). Manus and fingers, intercarinal surfaces weakly granular, nongranular surfaces densely punctate, more so in ♀, and covered with scattered microsetae, more so on fingers; D carina discontinuous, punctate, becoming weakly granular on distal third of manus and costate on distal two-thirds of fixed finger; SD carina restricted to proximal third of manus, mostly punctate, with few small granules proximally; DS carina complete, weakly granular and punctate on manus, becoming costate on fixed finger; DMA carina weakly granular and punctate on manus, becoming costate on fixed finger, well developed on proximal third of finger, becoming progressively less pronounced distally between *db* and dm_2 trichobothria, and becoming more pronounced distally thereafter; DI carina discontinuous, interrupted by two porous areas at base of fixed finger, weakly granular and punctate on manus, weakly developed and costate on distal three-quarters of fixed finger; E, VE, IM, and VI carinae mostly punctate (♀) or weakly granular and punctate (♂). Fixed finger, median denticle row continuous, complete; flanked by nine external and nine internal denticles; internal denticles not interspersed with accessory denticles; internal accessory denticles arranged in one discontinuous row, comprising 23–25 small denticles; external accessory denticles arranged in two rows, one adjacent to median row, continuous in proximal 80% of finger, second (externalmost) row, discontinuous, comprising 14 denticles in distal two-thirds of finger, interspersed with external denticles.

Trichobothria: Femur with three trichobothria (fig. 55A). Patella with 33 trichobothria (fig. 55B–D): two dorsal, seven ventral, 23 external, one internal; trichobothrium v_6 situated equidistant between v_5 and v_7; est_5 situated on VE margin and slightly distal to est_4; est_2 situated proximal to other *est* trichobothria; est_3 situated slightly proximal to or in same axis as est_4; *em* trichobothria variable (see Remarks); esb_2 usually situated distal to esb_3 (observed in same axis in several cases). Chela with 26 trichobothria (fig. 56): 10 situated on manus, three ventral, seven external; 16 situated on fixed finger, seven external, six dorsal, three internal (*it*, *ist*, *ib*); *isb* absent; *it* situated between et_3 and *est*; *Est* situated equidistant between V_3 and Et_1; Et_2 situated distal to Et_1; *Esb* situated proximal to or in same axis as Eb_2; *eb* situated near base of fixed finger; *db* situated proximal to *esb* or, rarely, in same axis (see Remarks); dm_1 situated slightly distal to et_3.

Legs: Prolateral surfaces granular, retrolateral surfaces smooth. Femur III, DI carina restricted to distal half of segment; DE and EM carinae obscured by dorsal granulation; VI carina complete. Patella III, DI carina complete; VI carina restricted to distal half of segment; other carinae obscured by granulation. Basitarsus III setose; two dorsal rows of small subspiniform granules, retrodorsal row complete, prodorsal row restricted to medial third of segment; one dorsal and two ventral rows of small brushlike spinules, retrodorsal and proventral rows restricted to distal third of segment, ventromedian row restricted to distal two-thirds. Telotarsus III setose, pro- and retroventral rows each with 6–7 elongated macrosetae.

Tergites: Pretergites I–VII, surfaces punctate. Posttergites I–VI, surfaces densely granular, finely granular in anterior half, becoming more coarsely so in posterior half, granules increasing in size posteriorly, especially on IV–VI (♂) or posttergites I–III smooth, punctate with sparse granulation along posterior margin of III, and IV–VI punctate and coarsely granular in posterior half, more so on VI; dorsomedian and dorsosubmedian carinae vestigial on posterior half of III–VI (♂) or V and VI (♀), slightly more pronounced on VI. Posttergite VII, surface finely and densely granular in anterior half, coarsely granular in posterior half (♂), or slightly punctate anteriorly with sparse granulation in posterior half (♀); paired dorsosubmedian and dorsolateral carinae well developed in posterior two-thirds; dorsomedian carina coarsely granular, forming low mound; posterior margin with transverse row of coarse granules.

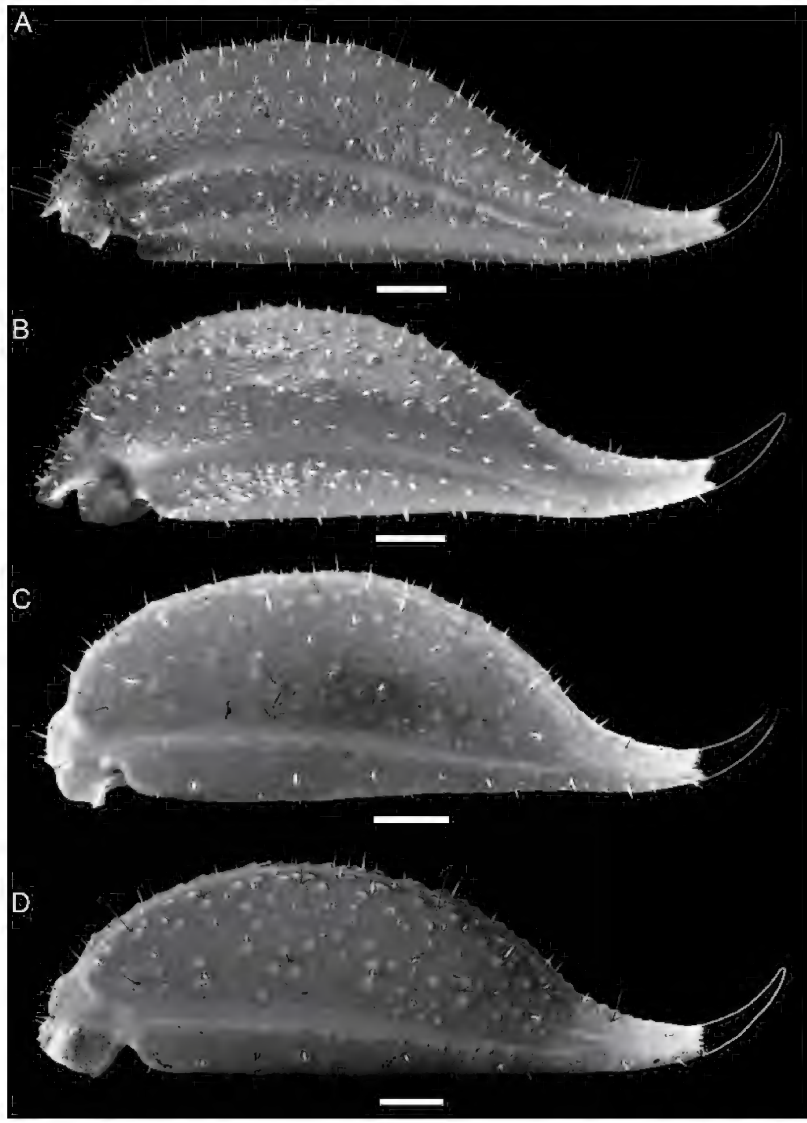

Fig. 69. *Megachactops*, n. gen., telson, lateral aspect. **A, B.** *Megachactops coriaceo* (González-Sponga, 1991), n. comb. **A.** Holotype ♂ (MAGS). **B.** Paratype ♀ (MAGS). **C, D.** *Megachactops kuemoi*, n. sp. **C.** Holotype ♂ (MHNLS). **D.** Paratype ♀ (AMNH). Scale bars = 1 mm.

Sternum: Ventral surface punctate, with 6–8 macrosetae, one pair situated anteriorly and two or three pairs on posterolateral lobes; lobes, apex and anterior margins each with several microsetae (fig. 46A, B).

Pectines: Pectinal tooth count: ♂, 10 ($n = 3$), 11 (18), 12 (5); ♀, 8 (4), 9 (35), 10 (19) (fig. 46A, B).

Sternites: Sternites III–VI, surfaces smooth, moderately (♀) or densely (♂) punctate, IV–VI each with scattered granules along lateral margins (♂); VII, surface smooth and punctate with scattered granules along lateral margins, VL carinae vestigial, each comprising three or four granules in medial third.

Metasoma: Segments I–IV, dorsal intercarinal surfaces finely and densely (♂) or sparsely (♀) granular; lateral surfaces coarsely and densely granular (more so in ♂) (fig. 47); ventral intercarinal surfaces coarsely and densely granular (more so in ♂),

nongranular surfaces punctate on segment I (♂) or I–III (♀); small porous area situated posteriorly at LIM position; DSM carinae comprising row of small granules on anterior two-thirds of segment I and anterior third of II, vestigial on III, absent on IV; DL carinae complete, granular, posterior three or four granules forming slightly elevated mound on segments I and II, more pronounced on III and IV; LSM carinae vestigial, comprising few small granules in median third of segments I–III and complete row of small granules on IV; ML carinae complete, granular on segments I–IV, posterior granules slightly larger than others, forming low mound, on I–III; LIM carinae complete on segment I, reduced to anterior half of segment and two or three posterior granules on II, reduced to few granules in anterior third and two or three posterior granules on III and IV; VL carinae complete, granular; VSM carinae obsolete on segment I, complete and moderately developed on II and III, complete and well developed on IV (fig. 47). Segment V length/width ratio, ♂, 1.83–2.10 (n = 12; mean = 1.94), ♀, 1.75–1.96 (n = 18, mean = 1.82); length/height ratio, ♂, 2.08–2.59 (n = 12; mean = 2.31), ♀, 2.03–2.46 (n = 18, mean = 2.17); dorsal intercarinal surface finely and sparsely granular; lateral and ventral intercarinal surfaces coarsely and densely granular (figs. 50A, B, 51A); porous area, situated posteriorly at LIM position, slightly more developed than on other segments; DL and VL carinae complete, granular; LSM carinae vestigial, obscured by granulation in anterior third of segment; ML carinae well developed, restricted to anterior two-thirds of segment; LIM carinae absent; VM carina coarsely granular, restricted to anterior two-thirds of segment, obscured by scattered granulation in posterior third (fig. 51A); VSM carinae absent or vestigial, reduced to row of small granules in anterior third.

Telson: Length/height ratio, ♂, 3.22–3.75 (n = 12, mean = 3.53); ♀, 3.40–3.85 (n = 18, mean = 3.59). Vesicle elongated, shallow; ventral surface entirely coarsely granular (♀) or coarsely granular in posterior half (♂), nongranular surfaces punctate (fig. 52A, B); dorsal and lateral surfaces smooth; lateral and ventral surfaces with few macrosetae and scattered microsetae. Aculeus slightly elongated and gently curved, more so in ♀.

Hemispermatophore: Lamina narrow, slender, approximately 15%–20% shorter than trunk (fig. 57A–C); apex elongated, curved, and progressively tapering distally; flagellum slightly undulated, approximately one-third the length of lamina; ental fold absent; articular flexure present, weakly developed; slight proximal constriction, forming moderately elongated pedicel (fig. 57A). Trunk well developed, elongated; sheath-shaped part well developed, occupying 80% of trunk, with median longitudinal sulcus; ventral concavity reduced; foot well developed, extending almost entire length of trunk. Lobe region reduced, with single lobe; ental lobe absent; median lobe moderately developed, extending to ventral surface, finely papillose entally, without spines or papillae distally; median trough deep, extending entire length of median lobe; dorsal apophysis well developed, laminar, apically subtriangular and acuminate.

REMARKS: Botero-Trujillo (2008) described *C. carolinae* based on three specimens (1 ♂, 1 ♀, 1 juv.) from a locality in the Vichada Department of Colombia, near the border with Venezuela and fairly close to the type locality of *C. anduzei*, n. comb., in the state of Amazonas. Botero-Trujillo (2008) described *C. carolinae* as most closely related to *C. anduzei*, n. comb., and separated it from the latter by the following characters: pedipalp chela trichobothrium *db* situated proximal to Et_4 (*esb* in the present contribution) in *C. carolinae*, but distal to Et_4 in *C. anduzei*, n. comb.; pedipalp patellar trichobothrium em_2 situated dorsal to est_5 in *C. carolinae*, but ventral to est_5 in *C. anduzei*, n. comb.; ventrosubmedian carinae absent from sternite VII in *C. carolinae*, but present, comprising obsolete granules, in *C. anduzei*, n. comb.; DL carinae of metasomal segment V well developed in *C. carolinae*, but weakly developed in *C. anduzei*, n. comb.; a broad yellowish (unpigmented) stripe evident medially along the tergites of *C. carolinae*, but absent in *C. anduzei*, n. comb. We examined the type specimens of *C. anduzei*, n. comb., and *C. carolinae*, and 44 additional specimens from the type locality and three adjacent localities in the state of Amazonas,

Venezuela: Puerto Ayacucho, Tobogan del Cuao, and Isla Ratón, the latter located approximately 70 km north of the type locality of *C. carolinae*. Based on the study of this material, we conclude that the diagnostic characters of *C. carolinae* fall within the known variation of *C. anduzei*, n. comb., and therefore propose the following new synonym: *Chactopsis carolinae* Botero-Trujillo, 2008 = *Chactopsoides anduzei* (González-Sponga, 1982), n. comb.

It is necessary to clarify three confusing characters in the original description of *C. anduzei*, n. comb.: (1) The position of pedipalp chela trichobothrium *db* is erroneously illustrated in González-Sponga's (1982: 130) figure 1 (*db* distal to *esb*). In fact, *db* is situated proximal to *esb*, i.e., Et_4 in Gonzalez-Sponga's (1982) notation, on the dextral chela of the holotype of *C. anduzei*, n. comb., and all except three other specimens examined, in which it is situated in the same axis as *esb*. (2) González-Sponga (1982: 132) mistakenly described the ML carinae (termed "dorsal lateral carinae") of metasomal segment V carinae as vestigial in *C. anduzei*, n. comb. These carinae are in fact well developed in the anterior two-thirds of segment V in the holotype and all other specimens examined. (3) The VL carinae of sternite VII are obsolete, and the VSM carinae absent, in all specimens of *C. anduzei*, n. comb., examined. The VL carinae were termed "paramedian carinae" by González-Sponga (1982: 132): "*el V esternito tiene dos carenas paramedianas que estan formadas por gránulos vestigiales*" and "lateral carinae" by Botero-Trujillo (2008: 39): "*without any vestige of paramedian carinae but with two slight elevations on the position of lateral carinae,*" but it is clear that both authors referred to the same structures.

The two other putatively diagnostic characters of *C. carolinae*, i.e., the presence of an unpigmented median stripe on the carapace and tergites, and the position of pedipalp patellar trichobothrium em_2, are variable in all populations of *C. anduzei*, n. comb., examined. For example, among specimens from the type locality (Caño Brava) and Puerto Ayacucho, the median stripe may be narrow and barely evident on the tergites (5/13 specimens), narrow on carapace and tergites (2/13), broad on carapace and narrow on tergites (1/13), narrow on carapace and absent on tergites (1/13) or absent on carapace and tergites (4/13, including the holotype). In the population from Tobogan del Cuao, the median stripe may be narrow on carapace and tergites (5/9 specimens), broad on carapace and narrow on tergites (2/9), or broad on carapace and tergites (2/9). In the population from Isla Ratón, the median stripe may be broad on carapace and tergites (11/19 specimens), broad on carapace and narrow on tergites (7/19) or narrow on tergites and carapace (1/19). Each of the three type specimens of *C. carolinae* exhibits a broad stripe on the carapace and tergites. The relative positions of pedipalp patella trichobothria em_2 and est_5 (em_3 in the present contribution) are also extremely variable, even differing in position on both pedipalps of the same specimen. Four different positions are evident for em_2, with respect to em_1 and em_3, among specimens from the type locality of *C. anduzei*, n. comb. (figs. 53, 54). The type material of *C. carolinae* matches the population from Isla Ratón more closely than the other populations, but falls well within the variation exhibited by the other populations.

DISTRIBUTION: This species is endemic to the Vichada Department of Colombia and the state of Amazonas in Venezuela (fig. 2). A previously reported record from Tapuriquara, in the state of Amazonas, Brazil (Lourenço and Francke, 1986; Lourenço, 1994a; 2002a, 2002b, 2005; Lourenço and Pinto-da-Rocha, 2000; Botero-Trujillo, 2008), is based on a single misidentified female specimen (MZSP 8755). This unique specimen probably belongs to *C. yanomami*, n. comb., given the proximity to the type locality of that species (Barcelos).

HABITAT: The known records of this species fall within primary rainforest in the Orinoco River basin (fig. 4A).

Chactopsoides gonzalezspongai, n. sp.
Figures 2, 4B, 5D, 9D, 45C, D, 46C, D, 48A, 49A, 50C, 51B, 52C, D, 58–61; table 5

TYPE MATERIAL: Holotype ♂ (MHNLS 1424), 6 ♂, 5 ♀ paratypes (MHNLS), 4 ♂,

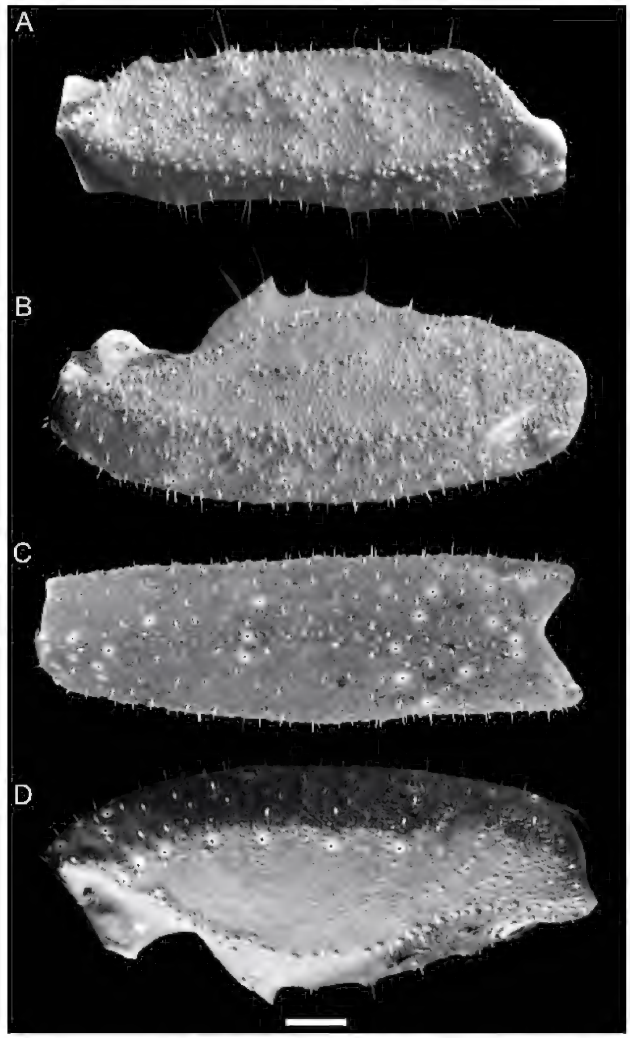

Fig. 70. *Megachactops coriaceo* (González-Sponga, 1991), n. comb., holotype ♂ (MAGS), dextral pedipalp segments. **A.** Femur. **B–D.** Patella. **A, B.** Dorsal aspect. **C.** External aspect. **D.** Ventral aspect. Scale bar = 1 mm.

3 ♀, 3 juv. paratypes (AMNH), 2 juv. paratypes (AMNH [LP 10093, 10094]), 1 ♂, 1 ♀, 3 juv. paratypes (MHNC), **VENEZUELA: Amazonas:** *Municipio Atabapo*: Isla Piñate, confluence of Orinoco and Ventuari rivers, 03°58′12.48″N 67°01′49.86″W, 92 m, 9.viii. 2009, F. Rojas-Runjaic, A. Ferrer, and J.A. Ochoa, forest.

ETYMOLOGY: The specific name is a patronym honoring the late Manuel Angel González-Sponga (1929–2009) for his contributions to the knowledge of the biodiversity of Venezuelan arachnids.

DIAGNOSIS: *Chactopsoides gonzalezspongai*, n. sp., may be separated from *C. anduzei*, n. comb., by the hemispermatophore morphology: the lamina is approximately the same length as the trunk in *C. gonzalezspongai*, n. sp., but 15%–20% shorter in *C. anduzei*, n. comb.; the median lobe and dorsal apophysis are less developed in *C. gonzalezspongai*, n. sp., than *C. anduzei*, n. comb. (figs. 57, 61); the sheath-shaped part occupies two-thirds of the trunk in *C. gonzalezspongai*, n. sp. (fig. 61), compared with 80% of trunk in *C. anduzei*, n. comb.

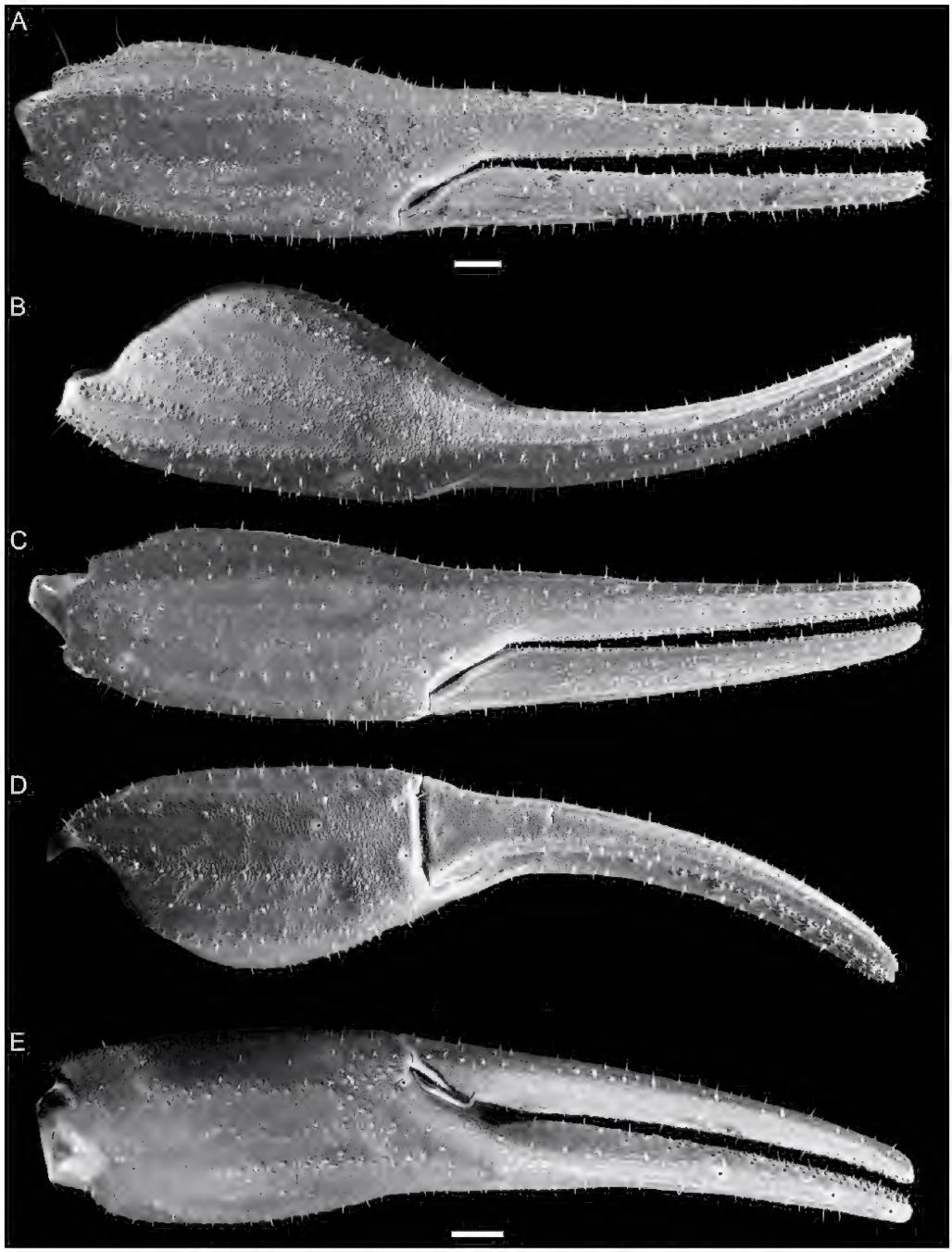

Fig. 71. *Megachactops coriaceo* (González-Sponga, 1991), n. comb., dextral pedipalp chela. **A.** Holotype ♂ (MAGS). **B–E.** Paratype ♀ (MAGS). **A, C.** External aspect. **B.** Dorsal aspect. **D.** Ventral aspect. **E.** Internal aspect. Scale bars = 1 mm.

(fig. 57). Other differences between the two species are as follows: the pedipalp chela manus length/width ratio is 4.00–4.58 (♂) and 3.82–4.15 (♀) in *C. gonzalezspongai*, n. sp., compared with 4.43–4.82 (♂) and 4.21–4.67 (♀) in *C. anduzei*, n. comb.; the LIM carinae of metasomal segments II and III are absent in the anterior third and represented by only a few granules posteriorly in *C. gonzalezspongai*, n. sp. (fig. 48A), whereas they are restricted to the anterior third of segments II and III in *C. anduzei*, n. comb. (fig. 47B); metasomal segments II–IV each exhibit three complete stripes of pigmentation (single VM and paired VL), and the VM stripe is complete in *C. gonzalezspongai*, n. sp., compared with two complete stripes of pigmentation (VL only), whereas the VM stripe is restricted to the anterior half of each segment in *C. anduzei*, n. comb. *Chactopsoides gonzalezspongai*, n. sp., differs from *C. marahuacaensis*, n. comb., as follows. The carapace is coarsely to finely granular, especially anteriorly and laterally (more so in ♂), in *C. gonzalezspongai*, n. sp. (fig. 45C, D), but mostly smooth, with scattered granules near anterior margin only, and nongranular surfaces punctate, in *C. marahuacaensis*, n. comb. (fig. 45E). The metasomal VSM carinae are complete and granular on segments II–IV in *C. gonzalezspongai*, n. sp. (fig. 49A), whereas the VSM carinae are obsolete on segment II, and complete and granular on segments III and IV in *C. marahuacaensis*, n. comb. (fig. 49B). The DMA carina of the pedipalp chela is costate on the distal quarter of the manus and on the fixed finger in *C. gonzalezspongai*, n. sp., but costate on the fixed finger only in *C. marahuacaensis*, n. comb. Chelal trichobothrium *db* is situated equidistant between *esb* and *eb* in *C. gonzalezspongai*, n. sp., but closer to *eb* in *C. marahuacaensis*, n. comb. The dimensions of metasomal segment V and telson provide additional differences between *C. gonzalezspongai*, n. sp., *C. anduzei*, n. comb., and *C. marahuacaensis*, n. comb. The length/width ratio of metasomal segment V is 1.63–1.90 (♂) and 1.63–1.72 (♀) in *C. gonzalezspongai*, n. sp., 1.83–2.10 (♂) and 1.75–1.96 (♀) in *C. anduzei*, n. comb., and 1.77–1.82 (♀) in *C. marahuacaensis*, n. comb. The telson length/height ratio is 2.72–3.28 (♂) and 2.63–3.13 (♀) in *C. gonzalezspongai*, n. sp., 3.22–3.75 (♂) and 3.40–3.85 (♀) in *C. anduzei*, n. comb., and 3.13–3.15 (♀) in *C. marahuacaensis*, n. comb.

DESCRIPTION: Based on the holotype ♂ and paratypes. Measurements of the holotype ♂ and a paratype ♀ recorded in table 5.

Total length: ♂, 21.00–30.7 mm (n = 11; mean = 26.01 mm); ♀, 30.39–33.30 (n = 8; mean = 31.8 mm).

Color: Base color brown to brownish yellow (adults; fig. 5D) or yellow (juveniles); carapace, tergites, sternite VII, metasoma, legs, and pedipalps with dark brown spots; sternites III–VI and coxosternal region yellow; pectines white; aculeus dark brown. Cheliceral manus, dorsal surfaces with fine reticulate pigmentation, becoming contiguous distally near base of fixed finger; fixed and movable fingers entirely pigmented. Carapace, median ocular tubercle and surfaces around lateral ocelli very densely pigmented; lateral and posterolateral surfaces densely pigmented, anteromedian longitudinal, postocular, and posteromedian longitudinal sulci unpigmented. Pedipalp femur, dorsal and external surfaces densely pigmented with small, unpigmented areas medially, ventral and internal surfaces faintly pigmented, with pigmentation stripes along DI, DE, VI, and EM carinae; patella, dorsal surface with irregular pigmentation and pigmentation stripes along DE and DI carinae, external surface with pigmentation stripe along EM carina and additional reticulate pigmentation, ventral surface with pigmentation stripes along VI and VE carinae, pigmentation on internal surface concordant with granulation; chela with pigmentation stripes along D, SD, DS, DMA, DI, E, IM, VI, and VE carinae, contiguous at base of fingers, VI and VE pigmentation stripes faint or absent. Legs, femur, prolateral surfaces faintly pigmented; patella and tibia pro- and retrolateral surfaces faintly pigmented. Tergites densely pigmented except for small, unpigmented area medially, forming narrow median stripe longitudinally across tergites, restricted to anterior half of tergite VII in some adults. Coxosternal region, genital operculum and pectines mostly unpigmented. Sternites III–VI, mostly unpigmented, except for faint spots anterolaterally; VII with two

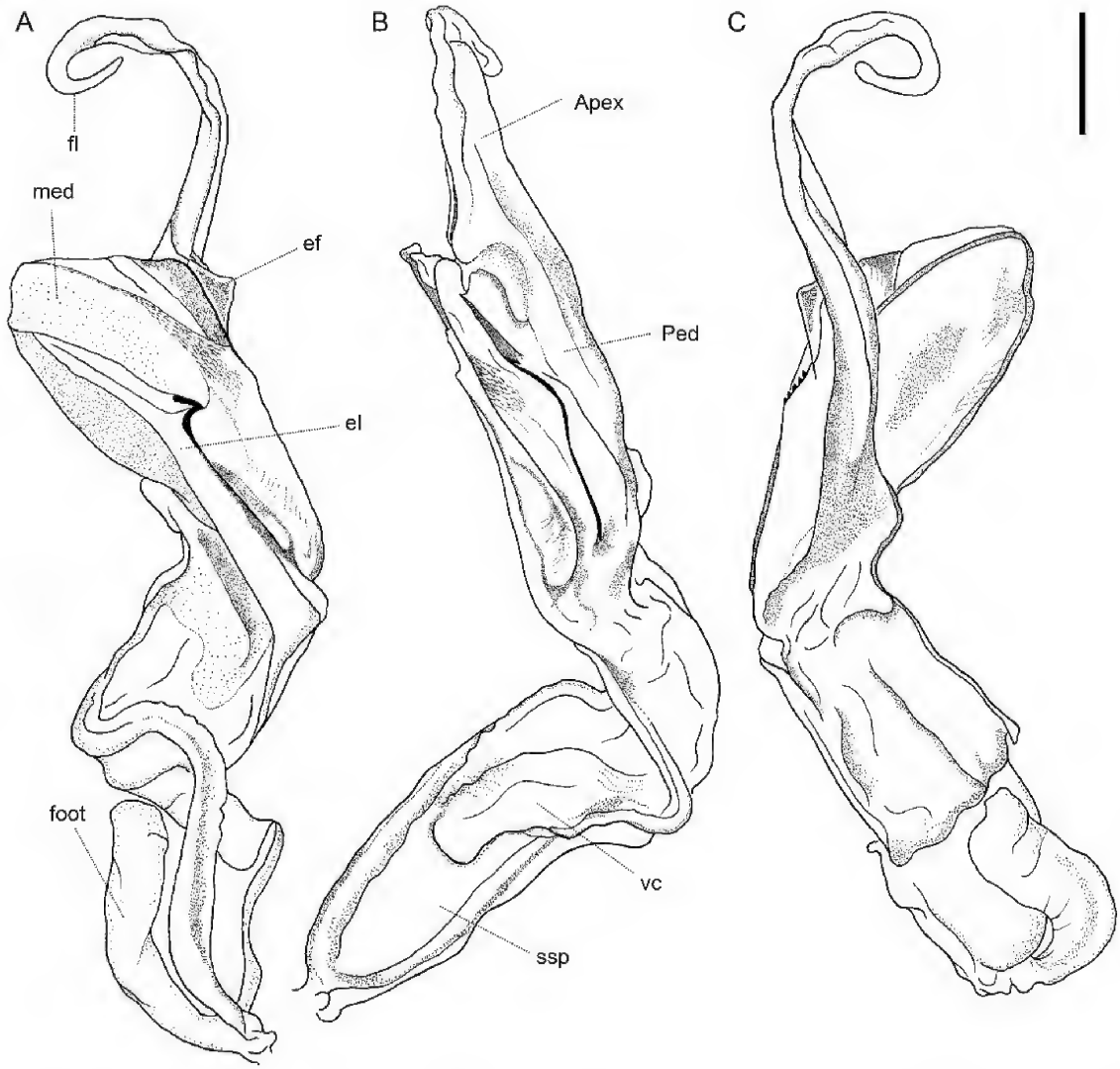

Fig. 72. *Megachactops coriaceo* (González-Sponga, 1991), n. comb., holotype ♂ (MAGS), sinistral hemispermatophore. **A.** Ental aspect. **B.** Dorsal aspect. **C.** Ectal aspect. Annotations: **ef,** ental fold; **el,** ental lobe; **fl,** flagellum; **med,** median lobe; **Ped,** pedicel; **ssp,** sheath-shaped portion; **vc,** ventral concavity. Scale bar = 1 mm.

broad, dark pigmentation stripes sublaterally and faint pigmentation submedially. Metasomal segments I–IV, dorsal surfaces each with pigmentation stripes along DSM and DL carinae, surfaces between DSM carinae with conspicuous subtriangular spots of pigmentation, sometimes divided by narrow unpigmented stripe; lateral surfaces each with pigmentation stripes along ML carinae and reticulate pigmentation along LIM and LSM carinae, surfaces between DL and ML carinae densely pigmented in posterior third of segment, surfaces between ML and VL carinae densely pigmented in posterior two-thirds; ventral surfaces each with paired pigmentation stripes along VL carinae, surfaces between VL and VSM carinae densely pigmented in posterior two-thirds of segment I, posterior half of II and III, and posterior third of IV, surfaces between VSM carinae densely pigmented, forming narrow stripe, not contiguous with lateral pigmentation

posteriorly. Metasomal segment V, dorsal surface with DSM pigmentation in anterior half of segment and pigmentation stripes along DL carinae; lateral surface with reticulate pigmentation along LIM and LSM carinae, and dense pigmentation stripes along ML carinae, becoming contiguous with DL pigmentation posteriorly, surfaces between ML and VL carinae densely pigmented in posterior third of segment; ventral surface with three dense pigmentation stripes along VM and paired VL carinae, contiguous in posterior third of segment, and with fine pigmentation stripes along VSM carinae in anterior third, surfaces between VL and VSM carinae densely pigmented in posterior two-thirds. Telson vesicle, dorsolateral margins with faint pigmentation in anterior half of segment; lateral and ventral surfaces more densely pigmented in juveniles; ventral surface with two broad VL and one narrow VM pigmentation stripes, separated by two narrow, unpigmented stripes.

Chelicerae: Movable finger with well-developed serrula, occupying slightly more than half its length; ventral subdistal tooth present.

Carapace: Anterior margin with shallow, biconcave median notch and several microsetae (fig. 45C, D); posterior margin sublinear, with shallow median notch and few microsetae. Surfaces entirely covered with variable fine and medium granulation (♂, fig. 45C), becoming more fine posterolaterally, or granulation restricted to interocular, circumocular, anterolateral and median lateral surfaces (♀, fig. 45D), granulation more pronounced in ♂; nongranular surfaces punctate, more so in ♀; scattered microsetae throughout. Median ocelli half an ocular diameter apart. Anteromedian longitudinal sulcus finely granular, nongranular surfaces punctate; posteromedian longitudinal sulcus punctate; other sulci smooth.

Pedipalps: Femur, length/width ratio, ♂, 2.84–3.13 (n = 11; mean = 3.02); ♀, 2.77–3.16 (n = 8, mean = 2.95); DE, DI, and VI carinae complete, granular (fig. 59A); EM carina restricted to distal third of segment, weakly granular (♂) or smooth (♀); VM carina granular, restricted to proximal third of segment; VE carina vestigial, reduced to three or four granules proximally; IM carina vestigial, reduced to three prominent, isolated granules in proximal half of segment; dorsal intercarinal surface with variable fine and coarse granulation, more dense in ♂, and slightly punctate in ♀, and with few coarse granules medially; external intercarinal surface almost smooth, punctate distally; ventral intercarinal surface smooth and punctate; internal intercarinal surface finely granular (♂) or punctate (♀). Patella, length/width ratio, ♂, 2.63–2.95 (n = 11; mean = 2.77); ♀, 2.45–2.61 (n = 8, mean = 2.54); DE, DI, and VI carinae complete, granular, DE slightly less developed (fig. 59B–D); EM and VE carinae obsolete, reduced to punctation and, in VE carina of some ♂, to weak granulation in proximal third in ♂; DPP comprising moderate proximal granule and additional smaller granules, VPP reduced to one or two smaller granules; dorsal intercarinal surface densely granular, more so in ♂, nongranular surfaces punctate, more so in ♀; external and ventral intercarinal surfaces smooth and punctate; internal intercarinal surface densely granular. Chela manus narrow (♂) or slightly incrassate (♀), fingers relatively elongated (fig. 60); chela length/width ratio, ♂, 4.00–4.58 (n = 11; mean = 4.31); ♀, 3.82–4.15 (n = 8, mean = 3.97); length/height ratio, ♂, 4.00–4.70 (n = 11; mean = 4.34); ♀, 3.93–4.15 (n = 8, mean = 3.99). Manus and fingers, intercarinal surfaces weakly granular, nongranular surfaces densely punctate, and covered with scattered microsetae; D carina discontinuous, punctate along entire length, becoming weakly granular in distal third of manus and costate on distal two-thirds of fixed finger; SD carina restricted to proximal third of manus, punctate, and with two or three granules proximally; DS carina complete, weakly granular and punctate on manus, becoming costate on fixed finger; DMA carina weakly granular and punctate in proximal three-quarters of manus, becoming costate in distal quarter and on fixed finger, well developed on distal quarter of manus and proximal third of fixed finger, becoming progressively less pronounced distally on finger until trichobothrium dm_2; DI carina discontinuous, interrupted by two porous areas at base of fixed finger, weakly granular and punctate on manus, costate on distal three-quarters of fixed finger; E, VE, and VI carinae punctate; IM carina weakly granular and punctate.

Fig. 73. *Megachactops kuemoi*, n. sp., habitus. **A, B.** Holotype ♂ (MHNLS). **C, D.** Paratype ♀ (AMNH) **A, C.** Dorsal aspect. **B, D.** Ventral aspect. Scale bar = 10 mm.

Fixed finger, median denticle row continuous, complete; flanked by nine external and eight internal denticles; internal denticles not interspersed with accessory denticles; internal accessory denticles arranged in one discontinuous row, comprising 21 small denticles; external accessory denticles arranged in one continuous row, interspersed with external denticles.

Trichobothria: Femur with three trichobothria (fig. 59A). Patella with 33 trichobothria (fig. 59B–D): two dorsal, seven ventral, 23 external, one internal; trichobothria v_6 and v_7 situated submedially, v_6 equidistant between v_5 and v_7; est_5 situated on VE margin and slightly distal to est_4; est_2 situated proximal to other *est* trichobothria, est_3 situated in same axis as est_4; em_1–em_3 usually situated slightly proximal to or in same axis as em_2; esb_2 situated distal to esb_3. Chela with 26 trichobothria (fig. 60): 10 situated on manus, three ventral, seven external; 16 situated on fixed finger, seven external, six dorsal, three internal (*it*, *ist*, *ib*); *isb* absent; *it* situated between et_3 and *est*; *Est* situated closer to Et_1 than to V_3; Et_2 situated distal to Et_1; *Esb* situated proximal to Eb_2; *eb* situated near base of fixed finger; *db* situated between *esb* and *eb*; dm_1 situated slightly distal to et_3.

Legs: Prolateral surfaces granular, retrolateral surfaces smooth. Femur III, DI carina restricted to distal half of segment; DE carina obscured by dorsal granulation; EM and VI carinae complete. Patella III, DI carina complete; VI carina comprising few granules, restricted to distal third of segment; other carinae obscured by dorsal and external granulation. Basitarsus III setose; two dorsal rows of small subspiniform granules, retrodorsal row on proximal two-thirds of segment, prodorsal row restricted to medial third; one dorsal and two ventral rows of small brushlike spinules, retrodorsal and proventral rows restricted to distal third of segment, ventromedian row restricted to distal two-thirds. Telotarsus III setose, pro- and retroventral rows each with 5–7 elongated macrosetae.

Tergites: Pretergites I–VII, surfaces punctate. Posttergites I–VI, surfaces finely granular in anterior half, coarsely and densely granular in posterior half, more so on III–VI (♂) or punctate and sparsely granular along posterior margin of I–III and sparsely granular in posterior half of IV–VI (♀); dorsomedian and dorsosubmedian carinae vestigial in posterior half of III–VI (♂) or IV–VI (♀). Posttergite VII, surface coarsely granular (more so in ♂); paired dorsosubmedian and dorsolateral carinae well developed in posterior two-thirds; posterior margin with transverse row of coarse granules.

Sternum: Ventral surface punctate, with six macrosetae (in one case eight), one pair situated anteriorly and two pairs on posterolateral lobes; apex and anterior margins with several microsetae (fig. 46C, D).

Pectines: Pectinal tooth count: ♂, 10 (n = 23), 11 (7); ♀, 7 (9), 8 (17) (fig. 46C, D).

Sternites: Sternites III–VI, surfaces smooth, punctate; VII, surface smooth and punctate with scattered granules along lateral margins, VL carinae vestigial, each comprising two granules in medial third.

Metasoma: Segments I–IV, dorsal intercarinal surfaces finely and densely granular (♂) or smooth, punctate (♀) (figs. 48A, 49A); lateral and ventral intercarinal surfaces coarsely and densely granular (more so in ♂), nongranular surfaces punctate (more so in ♀) (fig. 49A); small porous area situated posteriorly at LIM position on segments I–IV, slightly more developed on I than on II–IV; DSM carinae moderately developed, complete, granular on segment I, vestigial in anterior two-thirds of segments II–IV (less evident, obscured by fine granulation in ♂); DL carinae complete, granular, posterior granules forming low mound, more pronounced on segments III and IV; LSM carinae vestigial, weakly evident, comprising few small granules in medial third (♀) or obscured by granulation (♂); ML carinae complete, granular on segments I–IV, posterior granules slightly larger than others, forming low mound, on I–III; LIM carinae complete on segment I, reduced to few granules posteriorly on II–IV; VL carinae complete, granular, slightly more developed on segment IV; VSM carinae absent or obsolete, comprising two or three granules, on segment I, complete on II–IV, though less developed on II than on III and IV (fig. 49A). Segment V, length/width ratio: ♂, 1.63–1.90 (n = 11; mean = 1.78), ♀, 1.63–1.72 (n = 8, mean = 1.67); length/height ratio, ♂, 1.96–2.24 (n = 11; mean = 2.08), ♀, 1.85–2.03 (n = 8,

mean = 1.95); dorsal intercarinal surface finely granular, nongranular surfaces punctate; lateral and ventral intercarinal surfaces densely granular, more coarsely so in ♀; small porous area situated posteriorly at LIM position; DL and VL carinae complete, granular (more developed in ♀); LSM carinae vestigial, weakly evident in anterior two-thirds of segment (♀), or obscured by granulation (♂); ML carinae restricted to anterior two-thirds of segment; LIM carinae absent; VM carina coarsely granular, restricted to anterior two-thirds of segment, obscured by scattered granulation in posterior third; VSM carinae absent (♂) or vestigial, comprising row of small granules restricted to anterior third (♀) (fig. 51B).

Telson: Length/height ratio, ♂, 2.72–3.53 (n = 11, mean = 2.98); ♀, 2.63–3.13 (n = 8, mean = 2.97). Vesicle globose, more so in ♂; dorsal intercarinal surface smooth; lateral and ventral intercarinal surfaces finely and densely granular (♂) or coarsely granular, nongranular surfaces punctate (♀) (fig. 52C, D); ventral surface with several scattered microsetae. Aculeus short and gently curved (♂) or slightly elongated and more strongly curved (♀).

Hemispermatophore: Lamina narrow, slender, approximately same length as or slightly shorter than trunk (fig. 61A–C); apex slender, relatively elongated, curved, and tapering distally; flagellum slightly undulated, approximately one-third the length of lamina; ental fold absent; articular flexure present, weakly developed; slight proximal constriction, forming elongated pedicel. Trunk well developed, elongated; sheath-shaped part well developed, occupying two-thirds of trunk, with median longitudinal sulcus; ventral concavity reduced to distal third; foot well developed, extending almost entire length of trunk. Lobe region reduced, with single lobe; ental lobe absent; median lobe reduced, extending to ventral surface, finely and sparsely papillose entally, without spines or papillae distally; median trough deep, extending entire length of median lobe; dorsal apophysis well developed, sclerotized along margin, laminar, slightly folded toward dorsal surface.

DISTRIBUTION: *Chactopsis gonzalezspongai*, n. sp., is known only from the type locality in the state of Amazonas, Venezuela (fig. 2).

HABITAT: Specimens were collected by UV light detection at night, from leaf litter in primary rainforest (fig. 4B), on a small island at the confluence of the Orinoco and Ventuari rivers.

Chactopsoides marahuacaensis
(González-Sponga, 2004), n. comb.
Figures 2, 45E, 46E, 48B, 49B, 51C, 52E, 62, 63

Chactopsis marahuacaensis González-Sponga, 2004: 1, 6–8, plate II, map 1, table 2; Botero-Trujillo, 2008: 34.

TYPE MATERIAL: Holotype ♀ (MAGS 4434), paratype ♀ (MAGS 4433), **VENEZUELA: Amazonas:** *Municipio Alto Orinoco*: near Culebra village, near base of Marahuaca mountain, Cunucunuma river, 03°46′00″N 65°48′00″W, 250 m, iii.1983, P. Anduze.

DIAGNOSIS: Although the adult male of this species is unknown, it is placed in *Chactopsoides,* n. gen., on the basis of its trichobothrial pattern. *Chactopsoides marahuacaensis*, n. comb., differs from *C. anduzei*, n. comb., and *C. gonzalezspongai*, n. sp., as follows. In general, *C. marahuacaensis*, n. comb., is less granular than the other two species: the carapace is mostly smooth, with scattered granules near the anterior margin only, and nongranular surfaces punctate (fig. 45E), compared with *C. anduzei*, n. comb., and *C. gonzalezspongai*, n. sp. (fig. 45A–D), in which the carapace is coarsely to finely granular, especially anteriorly and laterally; the pedipalp chela manus external and ventral surfaces are mostly smooth and punctate in *C. marahuacaensis*, n. comb., but weakly granular, and the nongranular surfaces punctate in *C. anduzei*, n. comb., and *C. gonzalezspongai*, n. sp.; the LIM carinae of metasomal segments II and III are represented by only a few granules posteriorly in *C. marahuacaensis*, n. comb., and *C. gonzalezspongai*, n. sp. (fig. 48B), whereas they are restricted to the anterior third of the each segment in *C. anduzei*, n. comb. (fig. 47); the metasomal VSM carinae are obsolete on segment II, and complete and granular on segments III and IV in *C. marahuacaensis*, n. comb., but complete and granular on segments II–IV in *C. anduzei*, n. comb., and *C. gonzalezspongai*, n. sp. The

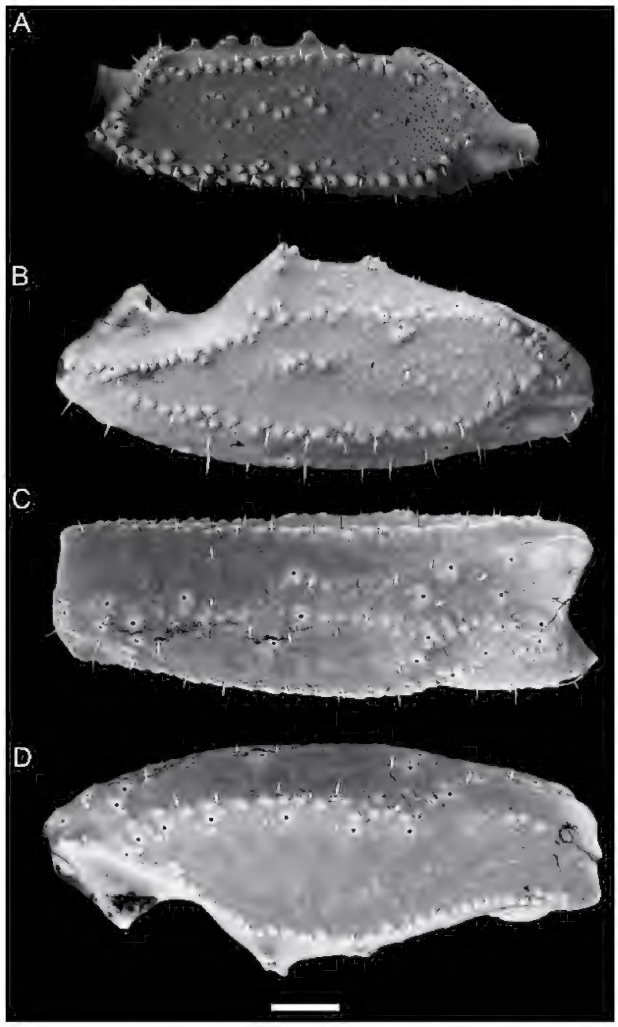

Fig. 74. *Megachactops kuemoi*, n. sp., holotype ♂ (MHNLS), dextral pedipalp segments. **A.** Femur. **B–D.** Patella. **A, B.** Dorsal aspect. **C.** External aspect. **D.** Ventral aspect. Scale bar = 1 mm.

DMA carina of the pedipalp chela is costate on the fixed finger only in *C. marahuacaensis*, n. comb., and *C. anduzei*, n. comb., but costate on the distal quarter of the manus and on the fixed finger in *C. gonzalezspongai*, n. sp. Chelal trichobothrium *db* is situated closer to *eb* in *C. marahuacaensis*, n. comb. (fig. 63A), slightly proximal to *esb* in *C. anduzei*, n. comb. (fig. 56B), and equidistant between *esb* and *eb* in *C. gonzalezspongai*, n. sp. (fig. 60B). The dimensions of metasomal segment V and telson provide additional differences between *C. marahuacaensis*, n. comb., *C. anduzei*, n. comb., and *C. gonzalezspongai*, n. sp. The length/width ratio of metasomal segment V (♀) is 1.77–1.82 in *C. marahuacaensis*, n. comb., 1.75–1.96 in *C. anduzei*, n. comb., and 1.63–1.72 in *C. gonzalezspongai*, n. sp. The telson length/height ratio (♀) is 3.13–3.15 in *C. marahuacaensis*, n. comb., 3.40–3.85 in *C. anduzei*, n. comb., and 2.63–3.13 in *C. gonzalezspongai*, n. sp.

SUPPLEMENTARY DESCRIPTION: The following supplements González-Sponga's (2004) original description.

Trichobothria: Femur with three trichobothria (fig. 62A). Patella with 33 trichobothria (fig. 62B–D): two dorsal, seven ventral, 23 external, one internal; v_6 and v_7 trichobothria situated submedially, v_6 equidistant between

Fig. 75. *Megachactops kuemoi*, n. sp., dextral pedipalp chela. **A.** Holotype ♂ (MHNLS). **B–E.** Paratype ♀ (AMNH). **A, C.** External aspect. **B.** Dorsal aspect. **D.** Ventral aspect. **E.** Internal aspect. Scale bar = 1 mm.

v_5 and v_7; est_5 situated on VE margin and slightly distal to est_4; est_2 situated proximal to other *est* trichobothria; em_1 situated slightly distal to em_2 and em_3; esb_2 situated slightly distal to esb_3. Chela with 26 trichobothria (fig. 63): 10 situated on manus, three ventral, seven external; 16 situated on fixed finger, seven external, six dorsal, three internal (*it*, *ist*, *ib*); *isb* absent; *it* situated between et_3 and *est*; *Est* situated equidistant between Et_1 and V_3; Et_2 situated distal to Et_1; *eb* situated near base of fixed finger; *db* situated between *esb* and *eb*, closer to *eb*; dm_1 situated slightly distal to et_3.

DISTRIBUTION: This species is known only from the type locality in the state of Amazonas, Venezuela (fig. 2).

HABITAT: The type locality of this species falls within primary rainforest.

Chactopsoides yanomami
(Lourenço et al., 2011), n. comb.
Figure 2

Chactopsis yanomami Lourenço et al., 2011: 67, 68, figs. 27–39, 53.

TYPE MATERIAL: Holotype ♂ (MNRJ), 9 ♂, 3 ♀ paratypes (MNRJ), 1 ♂, 1 ♀ paratypes (MNHN), **BRAZIL: Amazonas:** *Municipio de Barcelos*: Acampamento base, 2 km N Missão Marari, 01°12′26.4″N 64°47′18.1″W, 1350 m, 29.iv.2004, U. Caramaschi and H. De Niemeyer.

REMARKS: *Chactopsis yanomami* was recently described from Brazilian Amazonia. Based on the trichobotrial pattern illustrated in figures 32 and 34–39 of Lourenço et al. (2011), this species is placed unequivocally in *Chactopsoides*, n. gen. The original diagnosis and description of this species are uninformative and do not permit a satisfactory comparison with its congeners.

Megachactops, n. gen.

TYPE SPECIES: *Megachactops kuemoi*, n. sp.

ETYMOLOGY: The generic name reflects the larger size and close phylogenetic relationship with *Chactopsis*, and is masculine in gender.

DIAGNOSIS: *Megachactops*, n. gen., is most closely related to *Chactopsis* and *Chactopsoides*, n. gen. The three genera exhibit the following similarities, by means of which they may be separated from other chactid genera: cheliceral movable finger with one subdistal tooth on ventral margin; pedipalp patella with seven ventral trichobothria, chela manus with three ventral and seven external trichobothria, and fixed finger with 16 trichobothria; chela manus with nine carinae; fixed and movable fingers with multiple primary rows of denticles; metasomal segments with DL, ML, and VL carinae consistently present, and with porous areas situated posteriorly at LIM position.

Megachactops, n. gen., may be separated from *Chactopsis* and *Chactopsoides*, n. gen., as follows. The carapace exhibits distinct lateral median carinae, and its anterior margin possesses a conspicuous median notch in *Megachactops*, n. gen. (fig. 64), whereas the carapace is acarinate or with obsolete carinae and its anterior margin possesses a moderate to shallow median notch in *Chactopsis* and *Chactopsoides*, n. gen. (figs. 10, 11, 45). The pedipalp patellar DM carinae are present and the DPP prominent in *Megachactops*, n. gen. (figs. 70B, 74B), whereas the DM carinae are absent and the DPP present but weakly developed in *Chactopsis* and *Chactopsoides*, n. gen. Pedipalp patellar trichobothria v_6 and v_7 are aligned with v_1–v_5 and situated close to the VE carina in *Megachactops*, n. gen. (figs. 70D, 74D), whereas v_6 and v_7 are situated submedially and out of alignment with v_1–v_5, which are situated close to the VE carina, in *Chactopsis* and *Chactopsoides*, n. gen. Pedipalp chela trichobothrium *db* is situated medially on the fixed finger, and V_3 is situated in the distal third of the manus, closer to V_1 than to V_4 in *Megachactops*, n. gen., whereas *db* is situated in the proximal third of the fixed finger, and V_3 is situated medially on the manus, equidistant between V_1 and V_4, in *Chactopsis* and *Chactopsoides*, n. gen. The VSM carinae of metasomal segment IV are partial and the VM carina present (well developed or vestigial) medially in *Megachactops*, n. gen. (fig. 66, 68), whereas the VSM carinae are complete and the VM carina absent in *Chactopsis* and *Chactopsoides*, n. gen. (figs. 18, 19, 47). The ML carinae of metasomal segment V occupy less than half the length of the segment in

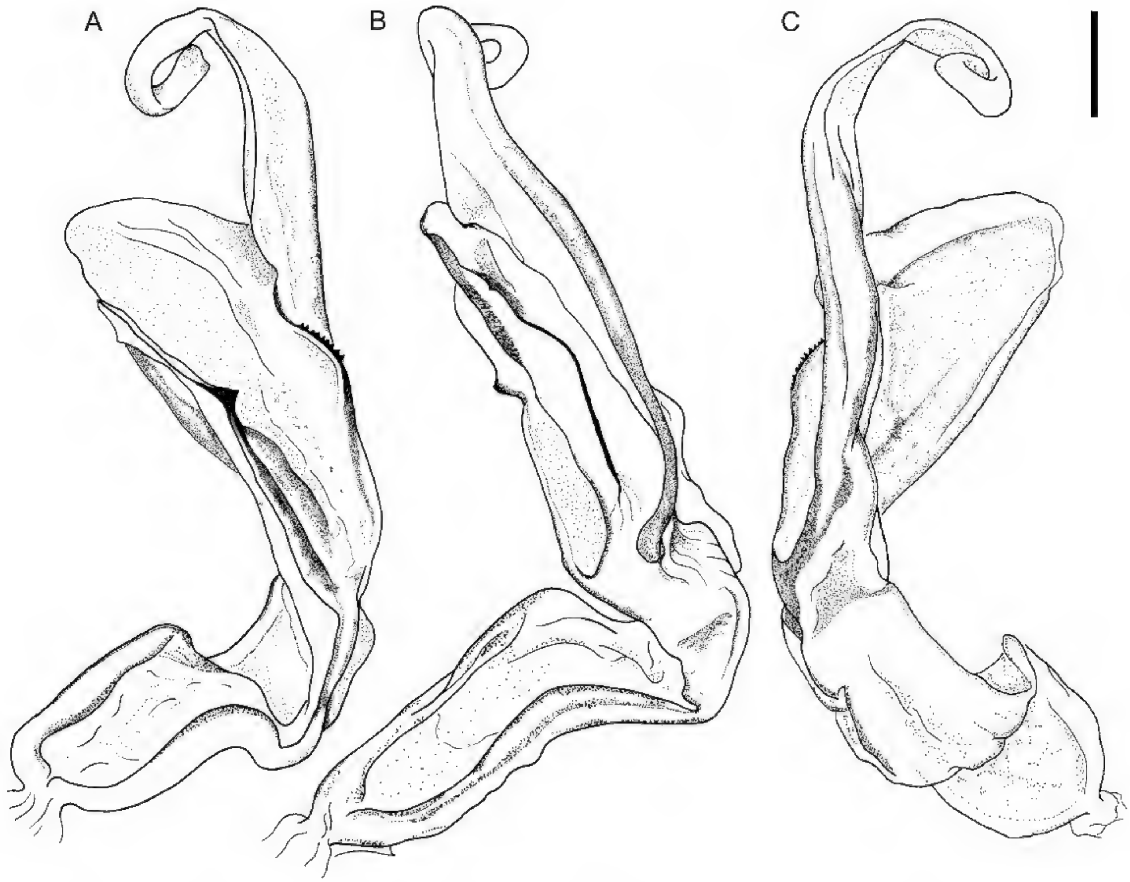

Fig. 76. *Megachactops kuemoi*, n. sp., holotype ♂ (MHNLS), sinistral hemispermatophore. **A.** Ental aspect. **B.** Dorsal aspect. **C.** Ectal aspect. Scale bar = 1 mm.

Megachactops, n. gen., but more than half its length in *Chactopsis* and *Chactopsoides*, n. gen. The hemispermatophore of the three genera differs as follows. The apex is short and subtriangular, the lobe region well developed, occupying a third of the hemispermatophore length, with two lobes, the ental lobe elongated, the median lobe auriculate and almost apapillose, and the dorsal apophysis absent in *Megachactops*, n. gen. (figs. 72, 76), whereas the apex is elongated, the lobe region reduced to one-fifth of the hemispermatophore length, the dorsal apophysis present, and the median lobe usually papillose in *Chactopsis* and *Chactopsoides*, n. gen.; the ental lobe is small in *Chactopsis* or absent in *Chactopsoides*, n. gen.

DESCRIPTION: The following general description outlines characters shared by both species of *Megachactops*, n. gen.

Total length: Scorpions of medium size, ranging in total length from 57–65 mm.

Coloration: The coloration in the two species is brownish with dark spots.

Chelicerae: Manus, dorsoexternal surfaces sparsely setose; ventral and internal surfaces densely setose. Fixed finger, dorsal margin with four teeth (distal, subdistal, median, and basal), median and basal teeth fused into a bicusp. Movable finger, dorsal margin with five teeth (distal, two subdistal, median, and basal); ventral margin with two teeth (distal, subdistal); dorsal distal tooth smaller than ventral distal tooth; ventral surface with short serrula.

Carapace: Anterior margin with deep median notch (fig. 64A–D). Posterior margin sublinear. Surfaces finely and densely granular (*M. coriaceo*, n. comb., fig. 64A, B) or coarsely granular with nongranular surfaces punctate (*M. kuemoi*, n. sp., fig. 64C, D); covered with scattered microsetae; anteromedian carinae well developed, granular; posteromedian carinae obsolete. Ocular tubercle well developed, situated slightly anteromedially; median ocelli well developed. Four pairs of lateral ocelli; anterolateral and median lateral pairs similar in size, approximately half the size of median ocelli; posterolateral pair smaller, approximately one-quarter the size of anterolateral and median lateral ocelli; dorsomedian pair greatly reduced, approximately one-quarter the size of posterolateral ocelli. Anteromedian longitudinal sulcus broad, well developed; postocular sulcus deep; posteromedian longitudinal, posterolateral, and posterior transverse sulci well developed; sulcus shallow.

Pedipalps: Patella, DM carina present. Chela manus narrow and cylindrical, with elongated fingers; nine carinae (D, SD, DS, DMA, DI, E, IM, VE, and VI) present, finely or moderately granular on manus. Fixed finger carinae moderately developed, granular; dentition very complex with multiple primary rows, median denticle row continuous, complete, flanked by nine or 10 internal and external denticles in distal two-thirds; and numerous accessory denticles arranged in five (three internal and two external) rows.

Trichobothria: Femur with three trichobothria (figs. 70A, 74A): one external (*e*), one dorsal (*d*), one internal (*i*). Patella with 33 trichobothria (figs. 70B–D, 74B–D): two dorsal (d_1, d_2); seven ventral (v_1–v_7), aligned and situated close to VE carina; 23 external (et_1–et_5, est_1–est_5, em_1–em_3, esb_1–esb_4, eb_1–eb_6); one internal (*i*). Chela with 26 trichobothria (figs. 71, 75): 10 situated on manus, three ventral (V_1, V_3, V_4), V_3 situated in distal third of manus, closer to V_1 than to V_4, seven external (Et_1–Et_3, *Est*, *Esb*, Eb_1, Eb_2); 16 situated on fixed finger, seven external (et_1–et_3, *est*, *em*, *esb*, *eb*), six dorsal (*dt*, *dst*, dm_1, dm_2, *dsb*, *db*), *db* situated slightly distal to or in same axis as *esb*, three internal (*it*, *ist*, *ib*), *ist* situated approximately medially on fixed finger, *isb* absent.

Legs: Prolateral surfaces usually granular, retrolateral surfaces smooth. Tibial spurs absent. Pro- and retrolateral pedal spurs present. Basitarsi setose, each with dorsal and ventral rows of small brushlike spinules. Telotarsi setose, each with ventromedian row of elongated spinules, flanked by two paired rows of setae (pro- and retroventral and pro- and retrolateral); ungues well developed, curved, equal in length.

Sternum: Shape subpentagonal with two lateral lobes, and lateral margins converging anteriorly; posterior width greater than length; posterior depression deep (fig. 65).

Pectines: Pectinal plate, anterior margin with conspicuous median notch, lateral margins converging posteriorly (more so in ♂). Pectines each comprising four lamellae, proximal and marginal lamellae larger, subdistal and distal lamellae smaller; fulcra absent (fig. 65). Tooth count, nine or 10.

Sternites: III–VI each with pair of small, oval spiracles, situated mediolaterally; surfaces finely and sparsely granular (*M. coriaceo*, n. comb.), or smooth and punctate (*M. kuemoi*, n. sp.). Sternite VII, VL carinae absent or obsolete, surfaces granular (*M. coriaceo*, n. comb.) or smooth (*M. kuemoi*, n. sp.).

Metasoma: Metasomal segments I–V, intercarinal surfaces coarsely and densely granular (*M. coriaceo*, n. comb.) or smooth and punctate (*M. kuemoi*, n. sp.); DL and VL carinae complete, granular; DSM and LSM carinae, vestigial or obsolete; DL carinae converging distally on segments I–III, subparallel on IV; ML carinae complete on segments I–IV, restricted to anterior half of V; LIM carinae less developed, complete only on segment I; porous areas, usually forming raised mounds, present posteriorly in place of LIM carinae on segments II–IV; VSM carinae discontinuous on segments III and IV, well developed (*M. coriaceo*, n. comb.) or obsolete (*M. kuemoi*, n. sp.); VM carinae restricted to anterior half of segments III and IV (vestigial in *M. kuemoi*, n. sp.), complete on V.

Telson: Vesicle slightly elongated. Aculeus short, gently curved (fig. 69).

Hemispermatophore: Lamina weakly sclerotized distally, lobe region and pedicel

strongly sclerotized (figs. 72, 76); apex, subtriangular, and tapering distally; flagellum short; ental margin of apex with shallow proximal fold; articular flexure present; slight basal constriction, forming elongated pedicel, broadly fused with lobe region. Trunk well developed, tortuous medially; proximal part forming sheath-shaped base; distal part concave on ventral surface; foot well developed. Lobe region well developed, occupying approximately one-third the length of hemispermatophore, with two lobes (ental and median lobes); ental lobe elongated, terminating in strongly sclerotized apophysis; median lobe well developed, auriculate, extended ventrally, forming internobasal reflexion of sperm duct, almost apapillose; median trough conspicuous; dorsal apophysis absent.

INCLUDED TAXA: Two species, *Megachactops coriaceo* (González-Sponga, 1991), n. comb., and *Megachactops kuemoi*, n. sp.

DISTRIBUTION: The genus *Megachactops*, n. gen., is endemic to the state of Amazonas, Venezuela (fig. 2).

HABITAT: Both known species of *Megachactops*, n. gen., inhabit primary rainforest.

Megachactops coriaceo (González-Sponga, 1991), n. comb.
Figures 2, 64A, B, 65A, B, 66, 67A, 68A, 69A, B, 70, 71, 72

Chactopsis coriaceo González-Sponga, 1991: 13, 26–32, 58, 59, figs. 21–27, map 1; 1996: 111, 115, figs. 256–259; 2001: 29, 41, 49, map 5; Lourenço, 2002b: 435.

Chactopsis coriacea: Sissom, 2000: 311; Soleglad and Sissom, 2001: 92; Rojas-Runjaic and de Sousa, 2007: 299; Botero-Trujillo, 2008: 34.

TYPE MATERIAL: **VENEZUELA: Amazonas:** *Municipio Rio Negro*: Holotype ♂ [not ♀] (MAGS 4691), 2 ♂ paratypes (MAGS 4613, 4614), paratype ♀ (MAGS 4706), 1 subad. ♂ paratype (MAGS 4708), Rio Mawarinuma [Baria River], base of tepui La Neblina, 00°55′N 66°10′W, ca. 140 m, 1.xii.1984, C. Brewer; paratype ♂ (USNM), same data except "3.vii.1984, A. Paolillo, C. Brewer and P. Anduze"; paratype ♀ (USNM), same data except "1.xii.1984, A. Paolillo, C. Brewer and P. Anduze."

DIAGNOSIS: *Megachactops coriaceo*, n. comb., may be distiguished from *M. kuemoi*, n. sp., as follows. *Megachactops coriaceo*, n. comb., is in general more granular, with more pronounced carination. The carapace is entirely finely and densely granular, the pedipalp patella intercarinal surfaces are mostly finely granular, the ventral intercarinal surfaces of metasomal segments I–V densely granular, and the lateral and ventral surfaces of the telson (♂) finely granular in *M. coriaceo*, n. comb. (figs. 64A, B, 66, 68A, 69A, B), whereas the carapace is coarsely granular (more so in ♂) with some smooth, punctate surfaces, the pedipalp patella intercarinal surfaces mostly smooth and punctate, and the ventral intercarinal surfaces of metasomal segments I–V and lateral and ventral surfaces of the telson (♂) are mostly smooth and punctate in *M. kuemoi*, n. sp. (figs. 64C, D, 67B, C, 68B, 69C, D). The pedipalp chela carinae are finely and densely granular in *M. coriaceo*, n. comb., but more coarsely and sparsely granular in *M. kuemoi*, n. sp. The pedipalp patella EM carina is obsolete, obscured by dense granulation in *M. coriaceo*, n. comb., but complete and granular in *M. kuemoi*, n. sp. The DSM carinae, present on metasomal segments I–III in *M. coriaceo*, n. comb., are absent in *M. kuemoi*, n. sp. The ventral intercarinal surfaces of metasomal segments I–V are densely granular in *M. coriaceo*, n. comb., but smooth in *M. kuemoi*, n. sp. The DL and ML carinae of metasomal segments I–IV, pronounced in *M. coriaceo*, n. comb., are obsolete in *M. kuemoi*, n. sp. The VM carinae are present in the anterior half of metasomal segments III and IV, and the VSM carinae in the anterior third of segment V in *M. coriaceo*, n. comb., whereas the VM carinae are absent on segments I–IV, and the VSM carinae are absent in the anterior third of segment V in *M. kuemoi*, n. sp. Other differences between the two species are as follows: the pectines and coxosternal region are densely covered with microsetae in *M. coriaceo*, n. comb., but sparsely covered (especially in ♀) in *M. kuemoi*, n. sp.; pedipalp chela trichobothrium *eb* is situated subproximal to the base of the fixed finger in *M. coriaceo*, n. comb., and proximal in *M. kuemoi*, n. sp.

SUPPLEMENTARY DESCRIPTION: The following supplements González-Sponga's (1991) original description.

Trichobothria: Femur with three trichobothria (fig. 70A). Patella with 33 trichobothria (fig. 70B–D): two dorsal, seven ventral, 23 external, one internal; v_1–v_7 aligned and situated close to VE carina; est_5 situated on external surface near VE carina, distal to est_4; est_3 situated slightly proximal to est_4; *em* trichobothria situated approximately in same axis, em_1 slightly distal to em_2 and em_3; esb_2 situated distal to esb_3. Chela with 26 trichobothria (fig. 71): 10 situated on manus, three ventral, seven external; 16 situated on fixed finger, seven external, six dorsal, three internal; *isb* absent; *it* situated between et_3 and *est*; *Est* situated equidistant between V_3 and Et_1; V_3 situated closer to V_1 than to V_4; Et_2 situated in same axis as Et_1; *Esb* situated proximal to Eb_2; *eb* situated near base of fixed finger; *db* situated slightly distal to *esb*; dm_1 situated slightly proximal to et_3.

Hemispermatophore: Apex short, curved to ventral surface, and tapering distally (fig. 72A–C); flagellum short, slightly curved; ental margin slightly undulate distally; ental fold short, subtriangular, situated at base of apex; pedicel elongated. Trunk well developed, strongly tortuous medially, sheath-shaped part approximately one-third the length of trunk; ventral concavity well developed; foot approximately half the length of trunk. Lobe region well developed, with two lobes; ental lobe elongated, terminating in strongly sclerotized apophysis; median lobe auriculate, extending entally and ventrally, approximately 80% the length of lamina, distal margin slightly folded, dorsal margin well sclerotized, with small spines medially, dorsal surface finely papillose, ental surface strongly sclerotized, apapillose; median trough deep, extending entire length of median lobe.

REMARKS: The sex of the holotype (♂) was misidentified in the original description as ♀.

DISTRIBUTION: *Megachactops coriaceo*, n. comb., is known only from the type locality in the state of Amazonas, Venezuela, near the border with Brazil (fig. 2).

HABITAT: The type locality of this species falls within primary rainforest at the base of tepui La Neblina.

Megachactops kuemoi, n. sp.
Figures 2, 4A, 5F, 9E, 64C, D, 65C, D, 67B, C, 68B, 69C, D, 73–76; table 5

TYPE MATERIAL: **VENEZUELA: Amazonas State:** *Municipio Autana*: Holotype ♂, 2 ♀ paratypes (MHNLS), paratype ♀ (MHNC), Tobogán del Cuao, 05°05′58″N 67°29′54″W, 124 m, 14–15.vii.2010, F. Rojas-Runjaic; 1 ♀, 1 subad. ♀ paratypes (AMNH), 1 subad. ♀ paratype (AMNH [LP 9230], 2 juv. paratypes (AMNH [LP 9244, 9247]), paratype ♀ (MHNC), Autana, near base of tepui Autana, 04°48′10.38″N 67°29′10.26″W, 84–90 m, 9.x.2008, S. Bazó, rainforest; paratype ♂ (AMNH [LP 5203]) ex E. Ythier, xi.2005. *Municipio Atures*: 1 juv. ♂ paratype (MHNLS), road Puerto Ayacucho–Gavilán, between La Reforma and Danto communities, 05°34′45.3″N 67°32′44.6″W, 91 m, 18.vii.2010, F. Rojas-Runjaic.

ETYMOLOGY: The specific name is a noun in apposition, referring to an Amazonian deity who created all dangerous and poisonous creatures of the night, from the folklore of the Piaroa of Venezuelan Amazonia.

DIAGNOSIS: *Megachactops kuemoi*, n. sp., may be distiguished from *M. coriaceo*, n. comb., as follows. *Megachactops kuemoi*, n. sp., is in general less granular, with less pronounced carination (figs. 64A, B, 66, 68A, 69A, B). The carapace is coarsely granular (more so in ♂) with some smooth, punctate surfaces, the pedipalp patella intercarinal surfaces mostly smooth and punctate, and the ventral intercarinal surfaces of metasomal segments I–V and lateral and ventral surfaces of the telson (♂) mostly smooth and punctate in *M. kuemoi*, n. sp. (figs. 64C, D, 67B, C, 68B, 69C, D), whereas the carapace is entirely finely and densely granular, the pedipalp patella intercarinal surfaces mostly finely granular, the ventral intercarinal surfaces of metasomal segments I–V densely granular, and the lateral and ventral surfaces of the telson (♂) finely granular in *M. coriaceo*, n. comb. The pedipalp chela carinae are coarsely and sparsely granular in *M. kuemoi*, n. sp., but more finely and densely granular in *M. coriaceo*, n. comb. The pedipalp patella EM carina is complete and granular in *M. kuemoi*, n. sp., but obsolete, obscured by dense granulation in *M. coriaceo*,

n. comb. The DSM carinae, absent on metasomal segments I–III in *M. kuemoi*, n. sp., are present in *M. coriaceo*, n. comb. The DL and ML carinae of metasomal segments I–IV, obsolete in *M. kuemoi*, n. sp., are pronounced in *M. coriaceo*, n. comb. The VM carinae are absent on metasomal segments I–IV, and the VSM carinae absent in the anterior third of segment V, in *M. kuemoi*, n. sp., whereas the VM carinae are present in the anterior half of segments III and IV, and the VSM carinae present in the anterior third of segment V in *M. coriaceo*, n. comb. Other differences between the two species are as follows: the pectines and coxosternal region are sparsely covered with microsetae (especially in ♀) in *M. kuemoi*, n. sp., but densely covered in *M. coriaceo*, n. comb.; pedipalp chela trichobothrium *eb* is situated proximal to the base of the fixed finger in *M. kuemoi*, n. sp., and subproximal in *M. coriaceo*, n. comb.

DESCRIPTION: Based on the holotype ♂ and several paratype ♀♀. Measurements of a holotype ♂ and a paratype ♀ recorded in table 5.

Total length: ♂, 56.8 mm; ♀, 65.87–67.94 mm ($n = 4$; mean = 66.62).

Color: Base color mostly brown with dark brown spots (fig. 5F); coxosternal region, pectines, and sternites III–V pale brown with brown spots; aculeus slightly darker terminally. Cheliceral manus, dorsal surfaces with fine reticulate pigmentation, becoming contiguous distally near base of fixed finger; fixed and movable fingers entirely pigmented. Carapace densely pigmented throughout; median ocular tubercle and surfaces around lateral ocelli very densely pigmented; anteromedian longitudinal sulcus densely pigmented, posteromedian longitudinal and postocular sulci faintly pigmented, with submedian pigmentation converging medially. Pedipalp femur, dorsal and internal surfaces densely pigmented, ventral and external surfaces faintly pigmented, with pigmentation stripes along EM and VM carinae; patella, dorsal and internal surfaces densely pigmented, ventral surface mostly unpigmented, with faint pigmentation stripes along VI and VE carinae, external surface with broad faint pigmentation stripe along EM carina and irregular faint pigmentation throughout; chela with pigmentation stripes along D, SD, DS, DMA, DI, E, IM, VI, and VE carinae, contiguous at base of fingers; fingers densely pigmented. Legs, prolateral surfaces densely pigmented, retrolateral surfaces faintly pigmented. Tergites densely pigmented throughout. Coxosternal region, genital operculum and pectines faintly pigmented. Sternites III–V faintly pigmented medially, more densely pigmented laterally; V with unpigmented subtriangular area medially; VI and VII densely pigmented throughout. Metasomal segments I–IV, dorsal surfaces each with pigmentation stripes along DSM and DL carinae, surfaces between DSM carinae densely pigmented, pigmentation contiguous with that along posterior margins of segment, with additional fine reticulate pigmentation submedially; lateral surfaces each with pigmentation stripes along ML carinae, surfaces between DL and ML carinae with reticulate pigmentation, surfaces between ML and VL carinae with reticulate pigmentation in anterior half of segment, densely pigmented in posterior half; ventral surfaces each with paired pigmentation stripes along VL carinae, becoming broader posteriorly, surfaces between VL and VSM carinae with reticulate pigmentation in anterior half, surfaces between VSM carinae densely pigmented, forming broad stripe, contiguous with lateral pigmentation in posterior half of segment I and posterior third of II–IV. Metasomal segment V densely pigmented on all surfaces; dorsal surface with reticulate DSM pigmentation in anterior half of segment, narrow DM pigmentation stripe connected to DSM pigmentation by fine reticulate pigmentation, pigmentation stripes along DL carinae, and dense pigmentation between DSM and DL pigmentation; lateral surfaces with reticulate pigmentation between ML and DL carinae, and pigmentation stripes along ML carinae, surfaces between ML and VL carinae with reticulate pigmentation in anterior half of segment and densely pigmented in posterior half; ventral surface with three dense pigmentation stripes along VM and paired VL carinae, contiguous in posterior third of segment, and with fine pigmentation stripes along VSM carinae in anterior half, contiguous with lateral pigmentation in posterior half and with VM pigmentation stripe in posterior third. Telson vesicle, dorsal surface densely

pigmented; ventral surface with two broad VL and one narrow VM pigmentation stripes, separated by two narrow, unpigmented stripes.

Chelicerae: Manus, dorsoexternal surfaces sparsely setose, ventral and internal surfaces densely setose. Fixed finger with four teeth. Movable finger with five teeth on dorsal margin and two teeth on ventral margin; ventral surface with vestigial serrula, restricted to ventral distal tooth.

Carapace: Anterior margin with deep, biconcave median notch and several microsetae, more so in ♂ (fig. 64C, D); posterior margin sublinear, with few microsetae. Surfaces coarsely granular throughout, especially on interocular, circumocular, anterolateral, and median lateral surfaces, granulation becoming more fine on posterolateral surfaces, nongranular surfaces punctate (♂), or mostly smooth and punctate, interocular, circumocular, anterolateral, and median lateral surfaces sparsely granular (♀); scattered microsetae throughout. Anteromedian carinae well developed, granular, less so in ♀; posteromedian carinae obsolete. Ocular tubercle punctate, smooth (♀) or with few granules (♂). Median ocelli one diameter apart. Anteromedian longitudinal sulcus smooth and punctate, with few granules along borders; postocular sulcus deep, smooth; posteromedian longitudinal sulcus smooth; posterolateral and posterior transverse sulci smooth with few granules along borders.

Pedipalps: Femur, length/width ratio, ♂, 2.93 (n = 1); ♀, 2.82–3.12 (n = 5; mean = 2.93); DE, DI, and VI carinae complete, granular (fig. 74A); EM carina vestigial, reduced to single distal granule; VM carina granular, restricted to proximal half of segment; VE carina vestigial, reduced to three or four granules proximally; IM carina reduced to several prominent, isolated granules on proximal two-thirds of segment; dorsal intercarinal surface coarsely granular medially, smooth and punctate elsewhere; other intercarinal surfaces smooth and punctate, except ventral surface weakly granular in anterior half (♂). Patella, length/width ratio, ♂, 2.45 (n = 1); ♀, 2.25–2.40 (n = 5; mean = 2.34); DM carina granular, restricted to medial third of segment; DE, DI, and VI carinae complete, granular, weakly developed medially (fig. 74B–D); EM carina weakly granular, absent (♀) or restricted to distal 80% of segment (♂); VE carina complete, weakly granular; DPP comprising prominent mound of three or four granules, associated with row of small granules on proximal two-thirds of segment; VPP less developed, comprising prominent mound of two granules, associated with two granules medially on segment; dorsal intercarinal surface smooth and finely punctate, except for scattered weak granules on distal half of segment (♂); external and internal intercarinal surfaces smooth and finely punctate, except for few weak granules medially (♂); ventral surfaces smooth and finely punctate. Chela manus slightly incrassate, fingers relatively elongated (fig. 75); chela length/width ratio, ♂, 4.05 (n = 1); ♀, 3.89–4.09 (n = 5; mean = 3.99); length/height ratio, ♂, 4.25 (n = 1); ♀, 3.75–4.04 (n = 5; mean = 3.90). Manus and fingers, intercarinal surfaces almost smooth, slightly punctate, and sparsely covered with microsetae, becoming more numerous on fingers; carinae obsolete, evident as subtle differences in angles between surfaces and weak granulation, more pronounced in ♂; D carina discontinuous, complete on manus, obscured by granulation on proximal quarter of fixed finger, and weakly costate on distal three-quarters; SD carina granular, restricted to proximal quarter of manus; DS carina complete, weakly granular on manus, becoming costate on fixed finger; DMA carina weakly granular on manus, weakly costate on fixed finger; DI carina discontinuous, interrupted by two porous areas at base of fixed finger, granular on manus, weakly costate on distal three-quarters of fixed finger; E carina complete, weakly granular (♂) or obsolete (♀); VE, VI, and IM carinae complete, weakly granular. Fixed finger, median denticle row continuous, complete; flanked by 10 external and 10 internal denticles; internal accessory denticles arranged in three rows, first row continuous in proximal half of finger, discontinuous in distal quarter, and interspersed with internal denticles, second and third rows each comprising 25 or 26 denticles, discontinuous, restricted to distal two-thirds of finger; external accessory denticles arranged in two

rows, one adjacent to median row, continuous in proximal 90% of finger, second (externalmost) row, discontinuous in proximal half and continuous on distal half of finger, interspersed with external denticles.

Trichobothria: Femur with three trichobothria (fig. 70A). Patella with 33 trichobothria (fig. 70B–D): two dorsal, seven ventral, 23 external, one internal; v_1–v_7 aligned and situated close to VE carina; est_5 situated on external surface near VE carina, distal to est_4; est_3 situated slightly proximal or distal to est_4; em_3 usually situated proximal to em_1 and em_2; esb_2 situated distal to or in same axis as esb_3. Chela with 26 trichobothria (fig. 71): 10 situated on manus, three ventral, seven external; 16 situated on fixed finger, seven external, six dorsal, three internal; *isb* absent; *it* situated between et_3 and *est*; *Est* situated equidistant between V_3 and Et_1; Et_2 situated in same axis as Et_1; *Esb* situated proximal to Eb_2; *eb* situated proximal to base of fixed finger; *db* situated slightly distal to *esb* (in same axis as *esb* observed in one case); dm_1 situated slightly proximal to et_3.

Legs: Prolateral and retrolateral surfaces smooth. Femur III, DI carina granular, restricted to distal half of segment; DE carina absent or vestigial, comprising few small granules distally; EM carina complete, weakly granular on proximal half, obsolete distally; VI carina complete. Patella III, DI carina complete, weakly developed; VI carina restricted to distal half of segment, weakly developed; other carinae absent; dorsal surface with small porous area proximally, retroventral margin with two porous areas, small area situated proximally, elongated area situated on distal half. Basitarsus III setose; prodorsal margin with two small porous areas, one situated proximally, one distally; dorsal margin with several small subspiniform granules on proximal two-thirds of segment; one dorsal and two ventral rows of small brushlike spinules, retrodorsal and proventral rows restricted to distal third of segment, ventromedian row restricted to distal two-thirds. Telotarsus III setose, pro- and retroventral rows each with 7–7 elongated macrosetae.

Tergites: Pretergites I–VII, surfaces punctate. Posttergites I–VI, surfaces smooth in anterior half, becoming coarsely granular in posterior half, more so on IV–VI (♂) or almost smooth and finely punctate, posterior margin with transverse row of small granules (♀); dorsomedian and dorsosubmedian carinae absent on III–VI. Posttergite VII, surface mostly smooth with slight granulation in places (♂) or entirely smooth and punctate (♀); dorsomedian and dorsosubmedian carinae forming three, weakly granular mounds; dorsolateral carinae granular (♂) or obsolete (♀); posterior margin with transverse row of granules.

Sternum: Ventral surface with 12 or 14 macrosetae, one pair situated anteriorly, and five or six pairs on posterolateral lobes; apex and anterior margins with several microsetae (fig. 65C, D).

Pectines: Pectinal tooth count: ♂, 9/9 (n = 2); ♀, 8 (1), 9 (1), 10 (10) (fig. 65C, D).

Sternites: Sternites III–VII, surfaces smooth, punctate; VII, acarinate.

Metasoma: Segments I–IV, intercarinal surfaces smooth and finely punctate, with small porous area posteriorly at LIM position; DSM carinae absent; DL carinae complete, coarsely granular on segments I–III, obsolete in IV; ML carinae complete, granular on segments I–IV; LSM carinae absent; LIM carinae each comprising single anterior granule on segment I, absent on II–IV; VL carinae complete, obsolete, granular; VSM carinae complete, obsolete, costate on segments I and II, incomplete (discontinuous medially) on III, incomplete, granular, more pronounced in posterior third on IV; VM carinae each represented by single granule medially on segment IV. Segment V, length/width ratio: ♂, 2.36 (n = 1), ♀, 2.15–2.29 (n = 5; mean = 2.22); length/height ratio: ♂, 2.60 (n = 1), ♀, 2.45–2.67 (n = 5; mean = 2.61); ventral intercarinal surfaces sparsely granular in posterior third, other intercarinal surfaces smooth; small porous area posteriorly at LIM position; DL carinae complete, obsolete, granular; LSM and LIM carinae absent; ML carinae moderately developed, granular, restricted to anterior third; VL carinae well developed, complete, granular; VM carina complete, granular (fig. 68B).

Telson: Length/height ratio, ♂, 3.16 (n = 1); ♀, 3.24–3.71 (n = 5, mean = 3.41). Vesicle slightly elongated; dorsal surfaces smooth; lateral and ventral surfaces finely and sparse-

ly granular, nongranular surfaces sparsely punctate (♂) or coarsely and sparsely granular, more so ventrally, nongranular surfaces densely punctate (♀) (fig. 69C, D), with few macrosetae and scattered microsetae. Aculeus short, gently curved.

Hemispermatophore: Similar to *M. coriaceo*, n. comb. Apex short, curved to ventral surface, tapering distally (fig. 76A–C); flagellum short, curved; ental margin slightly undulate distally; ental fold short, subtriangular, situated at base of apex; pedicel elongated. Trunk well developed, strongly tortuous medially, sheath-shaped part approximately one-third the length of trunk; ventral concavity well developed; foot unknown. Lobe region well developed, with two lobes; ental lobe elongated, terminating in strongly sclerotized apophysis; median lobe auriculate, extending entally and ventrally, approximately 80% the length of lamina, distal margin slightly folded, dorsal margin well sclerotized, with row of small spines medially, dorsal surface finely papillose, ventral surface strongly sclerotized, apapillose; median trough deep, extending entire length of median lobe.

DISTRIBUTION: *Megachactops kuemoi*, n. sp., is endemic to the state of Amazonas, Venezuela (fig. 2).

HABITAT: *Megachactops kuemoi*, n. sp., inhabits primary rainforest in the Orinoco River basin (fig. 4A).

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APPENDIX 1

Morphological Characters for Cladistic Analysis of *Chactopsis* Kraepelin, 1912, and Related Genera

Character states scored 0–4, ? (unknown), or - (inapplicable).

Refer to table 2 for character matrix and appendix 2 for material examined.

Carapace

0. Anterior margin: with conspicuous median notch (0); with moderate to shallow median notch (1); sublinear (2).
1. Median lateral carinae: present, well developed (0); absent or obsolete (1).
2. Nongranular surfaces (♀): smooth (0); punctate (1).

Chelicera

4. Movable finger, dorsal subdistal teeth, number: one (0); two (1).
5. Movable finger, ventral edge: smooth (0); with one subdistal tooth (1); with two or more subdistal teeth (2); with conspicuous median tooth (3).
6. Movable finger, ventral edge, serrula: absent (0); present (1).

Pedipalps

7. Patella, DM carina: present (0); absent (0).
8. Patella, DPP: prominent (0); moderately developed (1); weakly developed (2).
9. Patella, DPP and VPP, relative development: DPP more developed than VPP (1); DPP and VPP similarly developed (1).
10. Patella, VE carina: complete, granular (0); complete, costate (1); obsolete or absent (2).
11. Chela, carination: granular (0); punctate (1).
12. Chela, SD carina: present (0); vestigial (1); absent (2).
13. Chela, VE carina: costate (0); obsolete (1).
14. Chela fixed finger, porous areas at base: absent (0); present (1).
15. Chela fixed finger dentition: single median denticle row (0); median denticle row flanked by one row of accessory denticles (i.e., two rows) (1); single median denticle row flanked by two to four rows of accessory denticles (i.e., three to five rows) (2).
16. Chela fixed finger dentition, median denticle row orientation: oblique (0); straight (1).
17. Chela fixed finger, internal accessory denticles: absent (0); present (1).
18. Chela fixed finger, external accessory denticles: absent (0); present (1).

Pedipalp Trichobothria

19. Femur, trichobothrium *d*, position: situated basally (0); situated medially (1).
20. Patella, ventral trichobothria, number: three (0); five (1); seven (2); more than seven (3).
21. Patella, trichobothria v_6 and v_7, positions: aligned with v_1–v_5 (0); not aligned with v_1–v_5 (1).
22. Patella, *em* trichobothria, number: two (0); three (1); more than three (2).
23. Patella, *eb* trichobothria, number: five (0); six (1); more than six (2).
24. Chela fixed finger, trichobothrium *isb*: absent (0), present (1).
25. Chela fixed finger, trichobothrium *ist*: absent (0), present (1).
26. Chela fixed finger, trichobothrium dm_1, position: distal to et_3 (0); proximal to or in same axis as et_3 (1); inapplicable (-).
27. Chela fixed finger, trichobothrium *db*, position: medially on finger (0); at base of finger (1).
28. Chela manus, trichobothrium Et_1, position: in same axis as Et_2 (0); proximal to Et_2 (1).
29. Chela manus, trichobothrium *Est*, position: close to V_3 (0); equidistant between Et_1 and V_3 (1); situated on external surface (2).
30. Chela manus, trichobothrium Eb_3: absent (0), present (1).
31. Chela manus, trichobothrium Et_4: absent (0), present (1).
32. Chela manus, trichobothrium Et_5: absent (0), present (1).
33. Chela manus, trichobothrium V_2: absent (0), present (1).
34. Chela, manus, ventral trichobothria, number: three (0); four (1); more than four (3).
35. Chela manus, trichobothrium V_3, position: equidistant between V_1 and V_4 (0); situated in distal third of manus, closer to V_1 than to V_4 (1).

Mesosoma and Metasoma

36. Sternites, spiracles, shape: oval (0); rounded (1); elongated (1).
37. Metasomal segments, porous areas, present posteriorly in place of LIM carinae: absent (0); present (1).
38. Metasomal segment I, DSM carinae: present, often vestigial (0); absent (1).
39. Metasomal segments III and IV, DL carinae: granules not increasing in size posteriorly (0); posterior granule slightly larger than preceding granules (1); posterior granule considerably larger than preceding granules (2).
40. Metasomal segment IV, VSM carinae: present (0); absent (1).
41. Metasomal segment IV, VSM carinae: complete (0); incomplete (1); inapplicable (-).
42. Metasomal segment IV, VM carinae: present (0); absent (1).
43. Metasomal segment V, ML carinae: occupying more than half of segment (0); restricted to anterior half of segment (1); absent (2).
44. Metasomal segment V, VSM carinae: absent (0); obsolete, restricted to anterior third of segment (1).
45. Metasomal segment V, VM carinae: complete, not bifurcating in posterior quarter of segment (0); restricted to anterior three-quarters of segment, bifurcating in posterior quarter (1).

Hemispermatophore

46. Lobe region, median lobe: markedly developed, auriculate (0); well to moderately developed, folded (1); elongated (2); vestigial or absent (3); unknown (?).
47. Lobe region, ental lobe: present (0); absent (1); unknown (?).

48. Lobe region, dorsal apophysis: present (0); absent (1); unknown (?).
49. Lobe region, dorsal apophysis: horn shaped (0); crest shaped (1); elongated (2); dentate (3); laminar, folded (4), inapplicable (-); unknown (?).
50. Apex, shape: slender (0); broad (1); unknown (?).
51. Lobe region, ental lobe: elongated (0), reduced, not elongated (1); unknown (?).
52. Trunk, sheath-shaped portion: short, less than half the length of trunk (0); moderately developed, half the length of trunk (1); well developed, more than two-thirds the length of trunk (2); absent (3); unknown (?).
53. Trunk, foot: less than half the length of trunk (0); more than half the length of trunk (1); unknown (?).
54. Lamina, flagelum: curved (0); straight (1); slightly undulated (2); absent (3); unknown (?).
55. Lobe region, median lobe, distal margin, row of spines: present (0); absent (1); unknown (?).
56. Lobe region, median lobe: apapillose (0); finely papillose (1); densely papillose (2); unknown (?).
57. Lamina, ental fold: absent (0); situated on ental margin (1); situated at base of apex (2); unknown (?).
58. Lobe region, flagellum: absent (0), present (1); unknown (?).
59. Ventral concavity: absent (0); present (1); unknown (?).
60. Trunk, median longitudinal sulcus: absent (0); present (1); unknown (?).
61. Lobe region, median lobe, dorsal margin, row of small spines medially: absent (0); present (1); unknown (?).

APPENDIX 2

Additional Material Examined for Cladistic Analysis of *Chactopsis* Kraepelin, 1912, and Related Genera.

Museum abbreviations as follows: AMNH: American Museum of Natural History, New York, NY; MHNLS: Museo de Historia Natural "La Salle," Caracas, Venezuela; MHNC: Museo de Historia Natural, Universidad Nacional de San Antonio Abad del Cusco, Peru.

Broteochactas gollmeri (Karsch, 1879): VENEZUELA: *Distrito Federal Caracas*: El Hatillo, La Unión, Calle La Vaquera, 10°24.465′N 65°48.587′W, 1022 m, 20.vii.2009, F. Rojas-Runjaic, L. Prendini and J.A. Ochoa, 4 ♂, 7 ♀, 3 juv. (AMNH), 4 ♂, 7 ♀, 3 juv. (MHNLS).

Brotheas amazonicus Lourenço, 1988: BRAZIL: *Amazonas*: Municipio Manaus: Reserva Ducke, 02°55′34″S 59°57′37″W, 110 m, 16–17.xi.2010, A. Pepato and J.A. Ochoa, 1 ♂, 1 ♀ (MHNC).

Chactas vanbenedenii (Gervais, 1843): COLOMBIA: *Valle del Cauca Department*: Cali, Vereda Los Limones (west), 1000 m, 20.vii.2008, J. Moreno, 1 ♂ (AMNH); Pance, Cali, 03°19′42″N 38°18′82″W, 1623 m, 10.xii.2011, J. Moreno, C. Mattoni and J.A. Ochoa, 2 ♀ (MHNC).

Euscorpius flavicaudis (DeGeer, 1778): FRANCE: *Gard Department*: Cévennes mountains, Roquedur, L'Aumede, viii.1980, I. Davidson, 4 ♂, 1 ♀ (AMNH [AH 3157–3161]).

Iurus kinzelbachi Kovařík et al., 2010: TURKEY: *Aydin-Söke*: Davutlar, 800 m, 28.v.2005, H. Koç, 1 ♂ (AMNH [LP 4335]), 1 ♀ (AMNH [LP 4336]).

Megacormus sp.: MEXICO: *Veracruz*: Road to Tlaquilpan, 18°38.507′N 97°06.425′W, 2125 m, 19.vii.2002, L. Prendini and O. Francke, 1 ♂, 2 ♀ (AMNH).

Teuthraustes atramentarius Simon, 1878: ECUADOR: *Pichincha Province*: San Antonio de Pichincha, ca. Mitad del Mundo, 00°00.948′N 78°27.455′W, 2586 m, 22.i.2008, J.A. Ochoa, 2 ♀ (AMNH); Cantón Mejía, near Machachi, north of Cotopaxi, 00°32.015′S 78°33.205′W, 2942 m, 26.i.2008, F. Bersosa and J.A. Ochoa, 1 ♂, 1 ♀ (AMNH).